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TWENTIETH CENTURY PRACTICE

AN INTERNATIONAL ENCYCLOPEDIA

OF

MODERN MEDICAL SCIENCE

BY

LEADING AUTHORITIES OF EUROPE AND AMERICA

EDITED BY

THOMAS L. STEDMAN, M.D.
NEW YORK CITY

IN TWENTY VOLUMES

VOLUME XII

MENTAL DISEASES, CHILDHOOD, AND OLD AGE

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CONTRIBUTORS TO VOLUME XII.

J. Boy-Teissier, M.D., Marseilles.

Physician to the Hôpital Sainte-Marguerite (Hospice des Vieillards).

G. Fielding Blandford, M.D., F.R.C.P., London.

Lecturer on Psychological Medicine at St. George's Hospital.

Jules Comby, M.D., Paris.

Physician-in-chief to the Hôpital Trousseau; Honorary Physician to the Dispensaries for Sick Children of the Société Philanthropique; Editor of La Médecine Infantile.

Cesare Lombroso, M.D., Turin.

Professor of Legal Medicine and Psychiatry, University of Turin.

Paul A. Sollier, M.D., Paris.

Professor of Hygiene, Training Schools for Nurses of Paris; Chief of Clinic Adjunct for Mental Diseases, University of Paris.

INSANITY.

BY

G. FIELDING BLANDFORD,

LONDON.

INSANITY.

INSANITY is a general term which, for the sake of convenience, by popular use is applied to every variety of unsoundness of mind. We use it much as we use the word "fever." Medical men know that under the latter are ranked disorders differing widely in their nature and origin, as typhus and typhoid fever, malarial fever, surgical fever, septic fever, and so on. We do not describe these under one head as "fever." So we cannot describe or define under the one word "insanity" the whole mass of disorder to be seen within the walls of a large lunatic asylum. Among the inmates of such a place we may find congenital idiots and imbeciles varying greatly in mental capacity, persons suffering from organic disease of the brain, from the results of epilepsy, or chronic alcoholism, or syphilis, and besides these a number whose minds are disordered and subject to delusions and hallucinations—the people who are in common parlance called insane. And these again may be divided into the curable, who will get well and go away, and the incurable, always the larger number, who will remain in the same condition, or as age advances will gradually deteriorate until death releases them. They resemble one another only in this, that they are all of unsound mind and out of harmony with their environment, and are taken care of in such an institution because they are incapable of taking care of themselves or managing their affairs. This, of course, is a civil and not a medical definition. What the medical aspect of their disorder is must be now considered. Some writers speak of the *insanities* instead of *insanity*, which is a useful way of recording that we have not to deal with one form of disorder only. Just as there has been great differentiation of brain and spinal disorders, which formerly used to be comprised under the general terms brain disease and spinal disease, so as time and knowledge advance, insanity will not be kept as the one word half medical, half metaphysical, which is to cover every kind of mental trouble, but there will be more and more distinct and separate disorders which we may call insanities if we choose, or disorders of mind, or, what is still more correct, disorders of brain affecting the mind.

Five and twenty years ago I wrote that "I am convinced that the only method by which we shall attain an insight into the mysterious

phenomena of unsound mind is to keep ever before us the fact that disorder of the mind means disorder of the brain, and that the latter is an organ liable to disease and disturbance, like other organs of the body, to be investigated by the same methods and subject to the same laws."[1] Everything that has been done by investigators since the above date tends to confirm this view.

CEREBRAL ANATOMY.

Anatomical investigations, though they have been carried on unceasingly during all this period, have not done much towards the explanation of the disorder we call insanity, or the localization of the functions we call mind. Modern microscopic methods have taught that the nerve corpuscles do not anastomose by means of processes, but are separate and distinct and function only by contact.[2] Various advances have been made in our knowledge of the different layers of cells and their functions. Evolution shows that in the human brain there is the highest development both of structure and function, that this development has gone on through countless ages in the animal kingdom, and goes on in each individual from fœtal to adult life, during which damage or defective nutrition may occur and arrest it.

Localization of function as regards motion and sensation is laid down with tolerable certainty, and we may infer from it that the mental faculties are differentiated and have different seats; but these seats have not as yet been determined and experts differ widely in their views on the subject. "It seems reasonable to assume that there may be higher and lower degrees of complexity of evolution in the nervous structures, but we have as yet no conclusive proofs, either that the various degrees of evolution occur in the same centres, or that there exist separate or more highly evolved centres for the physical correlates of mentation."[3] The most recent writers agree to accept Ramon's and Golgi's description of the arrangement of the cortical cells. There are in a convolution of the Rolandic region four layers of cells. The first, called the superficial or molecular layer, is formed by a system of neuroglia fibre cells called by Andriezen caudate cells, which give rise to two distinct systems of fibres, viz., a tangential plexus radiating from the bases of the cells, and descending tufts of fibres passing through the subjacent layer and even reaching the third. Besides these there are ten or eleven different kinds of structures (glia and nervous) which enter into its composition, the bulk of them being neuroglia and not nerve cells. The second, called the layer of small pyramids, contains a number of cells, sometimes fusiform, sometimes pyriform, triangular or polygonal, interspersed with

a large number of small pyramidal cells with apical processes which end in tufts in the superficial layer. Collaterals are given off from those apical processes and also from the axis-cylinder process. The lateral expansions are numerous, extend for long distances, and end without anastomosing in similar expansions of other cells. The third layer, the zone of large pyramids, resembles the second, except in the size of the cells which are known as giant cells. These cells may be divided into two classes: those with short apical processes which do not pass into the superficial or molecular layer but terminate deeper, and those with long apical processes which always reach up to and end in the superficial layer. The fourth layer is a zone of polygonal cells, egg-shaped, spindle-shaped, or triangular. The apical processes of these cells do not reach the superficial zone, and the collaterals of the axis-cylinder process either end in terminal ramifications or form a plexus round some of the nerve fibres of the white medullary substance. Of the cells entering into the constitution of these layers Andriezen enumerates eight types: (1) The pyramidal with long apical process; (2) the pyramidal with short apical process; (3) the ambiguous which may be bicornate, globose, fusiform; (4) the granule cell; (5) the fusiform, with ascending axis-cylinder process; (6) the fusiform with descending axis-cylinder process; (7) the oblique and the inverted pyramidal; and (8) the polygonal with short branching axis cylinder.

Ramon y Cajal is of opinion that the psychical functions are inseparably associated with the presence of the pyramidal cells, because as we ascend in the animal series these bodies become larger and larger and more complicated. He is also of opinion that these pyramidal, or, as he calls them, "psychical" cells, may exercise their functions more fully and more usefully the greater the number of the collateral expansions of their axis cylinder, and the more copious, broad, and ramified their lateral and basal expansions, which have no anatomical connections and must therefore transmit impressions by contact.

There is an advance in complexity as we ascend from the reptilian to the mammalian brain, and that which has been described as the mixed pyramidal or polymorphic system of cells with short apical expansions is not found in the reptile. The order of progress is this: "We have first an increase of cortical grey expanse, until in man there is much complexity and depth of convolution of the grey substance. There is an increase in the development of the corpus callosum and an increase in the whole cerebral mass, both absolutely and relatively to the rest of the encephalon, from the lower mammals up to the higher mammals and man. The white matter of the cere-

brum is largely composed of association fibres which interweave in the most complex manner, and connect this or that cortical area with a number of others. In the human brain these form the main bulk of the white-fibre system, the others being the callosal and the upward and downward projection system. While many of these association fibres and commissural fibres are derived from the long pyramidal and ambiguous cells, the whole system of mixed pyramidal or polymorphic cells, *i.e.*, the fourth layer, contributes largely also to the association system." [4]

The grey substance and white substance of the brain differ widely as regards their supply of blood. The former is supplied by the arteries of the pia mater, and the quantity of blood thus brought is very large. The white matter of the cerebrum is supplied by small arteries which come off at right angles from the three cerebral arteries near their origin, and the supply is not nearly so abundant.

Anatomically the distribution of the arteries and veins is well ascertained. But the vasomotor system is not definitely made out. "It has not yet been proved how far we may regard the cortex as possessing vasomotor centres. With arterial systole we have vasoconstrictor influence, and with the arterial diastole we have vasodilator influence at work; but, as pointed out by Meynert, mental processes are not interrupted by arterial systole; therefore they must to a certain degree be independent of functional hyperæmia. Meynert thinks that this independence of mental acts may possibly be due to the fact that the cortex itself acts as a vasomotor centre in its relations to subcortical centres; and arguing from the evidence of the influence of cerebral activity over the vasomotor centre, he concludes that the vasomotor nerves of the cortex do not reach the blood-vessels at once, but are interrupted in the subcortical vasomotor centre; and that these subcortical centres must be constantly in a state of activity for the vascular innervation of the cortex." [5]

That the influence of the cortex has much to do with the supply of blood must be easily recognized from the phenomena of every-day life. Mental excitation, whether pleasurable or painful, causes an increase of vascular action in the brain and prevents sleep. On the other hand, bodily causes may also, by increasing the action, prevent sleep, causes such as alcohol, tea, tobacco, and in some opium. These are not mental, but they equally cause an increase of the cerebral vascular action, and we hear the vessels pulsating with increased energy in our head as it lies on the pillow. Through the mental action of the cortex the nutrition may be soon disordered, for the increased action means increased waste, and intracranial pressure with venous or capillary stasis will soon give rise to imperfect nutri-

tion. It may also be due to pathological changes in the vessels themselves, atheroma, fatty or calcareous degenerations, or be the result of alcohol, syphilis, or old age. Knowing as we do how large is the supply of blood necessary for the proper function of the grey matter of the brain, it is obvious that any interference with this, either by diminution or increase or defective quality, must almost at once be apparent in some alteration of the normal action.

As a result of this hyperæmia we find a great strain thrown upon the structures which are concerned with the removal of the waste products of the brain. There are no true lymphatics, but their place is supplied by a perivascular system which leads from the nerve cell to the true lymphatic vessels. This system is constituted as follows: 1. There are pericellular sacs or spaces around the larger nerve cells, the brain substance having, as it were, receded from the cell, so that it is enclosed within a circular, oval, or pyriform space. 2. These sac-like dilatations are contained within a perivascular channel and are prolongations of the cellular elements of the adventitial lymph sheath, which is loosely applied round the arterioles and venules, and is contained in a non-distensible channel of the brain substance, the perivascular channel of His. 3. Besides these channelled vascular tracts and saccular ampullæ along the capillary tube we find a lymph connective system constituted by neuroglia cells, giving off two sets of processes, the one, an enormous number of extremely delicate fibres which spread into the intervascular area around, and the other, a much thicker, coarser process which, often after a tortuous course, ends in the adventitial sheath of the blood-vessel. These, which have been called Deiter's or spider cells, play an important part in the reabsorption and distribution of effete material and surplus plasma, and become hypertrophied and morbid if there is any arrest in the escape of perivascular lymph from the cortex.[6] It is also supposed that the Pacchionian villi afford a method of communication, extending, as they do, from the arachnopia through the subdural space.

Neuroglia.—The whole substance of the brain, gray and white, is pervaded by a protective system of neuroglia fibres, a fine diffuse feltwork of fibrils radiating from stellate fibre cells scattered throughout the whole cerebral mass. They exhibit a more condensed fibre feltwork in certain regions, especially the surface region of the cortex and along the borders of the intracerebral vascular canals, and act as an admirable protective mechanism.[7]

PATHOLOGY AND ETIOLOGY.

These anatomical structures are common to all brains of the human species. The average man possesses them and with them is enabled to live the life of an average member of the society to which he belongs, whether it is the lowly developed life of the savage or the highly complex and differentiated association of civilized races. If he cannot live this life, but instead of being in harmony with it is incapable of adjusting himself to his surroundings, the reason for this want of harmony must be sought. We have now to consider only the individual and contrast him with the average of those about him. If the society in which he lives is highly complex and one gradually evolved through many ages, it follows that his mental nature must also be highly evolved, that there must be great complexity of feelings and the relations of feelings, and the composition and ideas of relations of which mind consists. It may be that this complexity is never reached, that the developing child is never sufficiently evolved to reach the high mental attainment of the right rule of conduct which regulates the affairs of life and society with judgment, prudence, and restraint. Congenital defect, imperfect development, or improper training may prevent it; or when it has been attained, it cannot be retained owing to the slight organization and instability of the highest centres, which are continually giving way under the strain of ordinary life, or such causes as alcohol, syphilis, or epilepsy. The highest centres become impaired and lose the command of the whole system, and the lower centres of the reduced brain come into action unfettered and uncontrolled, and so the individual sets at defiance the laws and conventions of society and the reversed process sets in. Instead of the evolution to a higher level where "altruistic sentiments" and "object consciousness" are cultivated and organized, the egotistic feelings or subject consciousness rise in proportion, the reduction brings a man down to the level of a child or an uneducated and untrained person, nay, it may even bring him to a level lower than that of a savage.

Predisposing Causes or Tendencies.

When we have before us a patient who has become insane it is necessary that we examine to the best of our opportunities and ability his life history—the history of his parentage, birth, and bringing up, and the conditions and causes which have put him out of harmony with his surroundings, his fellow men and women, and his position in his society.

Heredity.—Most important but most difficult to investigate is his parentage. In every book we find heredity mentioned as one of the chief causes of insanity, and statistics are given by various authors of the number of cases in which there was a history of inherited disease. So difficult is it to ascertain this with accuracy that it is not surprising that writers vary greatly in the numbers they arrive at, one observer attributing ten per cent. of cases to this cause, another no less than ninety. Probably no two form their calculations in the same way. One man reckons only the patients whose insanity is inherited in the direct line from father or mother, while others take into account that which is found to exist in collateral branches. Moreover, insanity may appear in a family the former generation of which has been free from it, but has manifested neurotic disease, such as epilepsy or dipsomania. It is most difficult to get at the true history of a family even for three generations. The history of two grandfathers and two grandmothers is very hard to ascertain with anything like exactness, but if we go back still further and try to work out the history and disorders of four great-grandfathers and four great-grandmothers, our task is wellnigh hopeless; and it is important that we should know the career not only of those in the direct descent but of all the uncles and aunts and cousins, if we are rightly to appreciate the influence of the inherited taint. I know families in which insanity has existed beyond a doubt in three generations, but it cannot be thoroughly investigated because any question on the subject is at once evaded, or a direct negative is the only response we are able to get. If we could ascertain with accuracy the individuals in a large family who have lapsed into insanity or have been the victims of neurotic disease, we ought also to inquire as to the causes of the breakdown, and why certain people have fallen while others have escaped. Here again we are met with difficulties which are insuperable. A family becomes scattered, some going to the colonies or foreign lands, and we can gain no information about them on which any reliance can be placed. The relatives withhold the fact that some have become insane; if they have taken to drink, this is equally withheld, and of injury to the head or syphilis, probably nothing is known. It would be most interesting to know why others of the same family escape. Some do not, and though not insane, are neurotic, afflicted with hysteria, hypochondria, epilepsy, or neuralgia. Yet we find some, even in a family saturated with insanity, who are strong in mind and body, and apparently as little likely to become insane as any we know. What are the conditions in which these have been brought up and lived?

Certain laws of heredity have been laid down by Darwin and

others which have to be considered by those who have to treat of this subject, and they have been ably set forth by Dr. Mercier in his papers on the "Data of Alienism." "The first and most fundamental law of heredity is that every attribute of the parents tends to be inherited by the offspring. Inheritance is the rule, non-inheritance the exception." It is not said that every attribute is inherited, which would be manifestly false, but that every attribute tends to be inherited, and will be, unless some opposing influence counteracts this tendency.

Mercier mentions certain propositions which express the partial operation of this law. The first is "that an attribute which appeared in the parent at a certain period of life tends to appear in the offspring at a corresponding period." This may be true of the ordinary changes in the lower animals, but we have not enough statistics to show that it is the rule in the insane. Another is that "when the same attribute appears in several generations, but is not congenital, it may appear at an earlier age in each successive generation." Many statistics would be required to prove this to be true of the insane, and so also with regard to the transmission of the disorder to one sex only, or to offspring of the opposite sex only.

Passing over some other propositions we come to the second law of heredity, which Mercier calls the law of the limited dissimilarity of parents. "There are certain limits, on the one hand of similarity and on the other of dissimilarity, between two individuals, between which limits only can the union of the two be fertile; and in proportion as these limits are approached, the offspring deteriorates in organization."

Under the head of similarity he discusses the marriage of cousins. "If two brothers inherit strongly the characters of one of their parents, and if each transmits these qualities prepotently to his children, the cousins thus produced will have not only a close relationship of blood but a close similarity of physiological characters, and if they marry, their offspring will be likely to be imperfect. If, however, of two brothers one inherits strongly the characters of the father and the other exhibits a strong reversion to the maternal great-grandfather, and if the children of one brother inherit mainly from the father while the qualities of the mother are prepotent in the children of the other, it is evident that although the blood relationship is as near as in the former cousins, yet since these cousins have a considerable physiological dissimilarity, their offspring will be likely to be well developed. In this reasoning we find an explanation of the varying conclusions of those who have studied the marriage of near kin. It is admitted by breeders of animals that it is the effect of

continued in-breeding that is detrimental, and the union of a pair of cousins would not come under this description."

Mercier sums up the question of the marriage of first cousins as follows:[9] "The first consideration is whether in the family common to both cousins there is an inheritance of insanity. If there be, and if the inheritance is from a near ancestor—if, for instance, it is from one of the common grandparents—the union should under almost all circumstances be forbidden. If there is no inheritance of insanity in the common family, but near inheritance in each of the separate families, the union should be forbidden. If there is no inheritance in the common family and near inheritance in one only of the separate families, the kinship alone need be no bar to marriage."

A certain similarity or suitability is necessary for the production of well-organized offspring. There must be kinship but not too close kinship. On the other hand too great dissimilarity has its disadvantages. The development of cross-bred offspring is rapid, but it shares the defect of all rapid growth in the result being unstable. "If a higher stage of development is attained so that the superior nerve regions reach a greater complexity and elaborateness of structure, this greater complexity and elaborateness carries with it a greater obnoxiousness to disordering influences, a greater liability to become disordered; and when this more complex structure is developed at a more rapid rate, the tendency of the structure so formed to fall into disorder becomes additionally pronounced. Hence we find that the offspring of somewhat too dissimilar parents develop rapidly, attain early to a high degree of intelligence, and are prone to disorder of the structures last developed—the highest nerve regions." The effects of crossing highly civilized men with women of lower races has been noted by Darwin, who speaks of the degraded state and savage disposition of crossed races of man. Residents in the West Indies and elsewhere have told me of the peculiar mental characteristics of the "brown" man, the offspring of Europeans and blacks. I myself have known a family, the children of a gentleman and a gypsy girl, several members of which have been insane; it will in all probability become extinct.

It is said with truth that in a family saturated with insanity the tendency is either to extinction or to throw off the taint of the mental disorder by the admission into it of healthy blood. The latter, however, may take a long time owing to the phenomena of reversion. A parent who has suffered from insanity or some other neurotic disorder may transmit this to his children or some of them. Some may escape, but if they mate with wives who are not themselves of a stable nature, their children will in all probability show some form

of nervous defect. The latency of insanity is ever to be borne in mind when the marriage of any one is discussed whose family has contained examples of the disorder, especially if these have occurred at an early period of life. We are constantly consulted about the marrying of such individuals, not cousins, but persons in whose family insanity exists or who have themselves had attacks. This subject will be considered later, as also the prognosis in the cases in which the insanity is hereditary. At present it is to be remembered that there is a tendency to insanity in members of a family where it exists, even if it has not appeared in either the father or mother of the individual. This is due to *latency*, or *reversion*, or *atavism*—important laws which are apt to be overlooked by those who wish to ignore the taint. As for the transmission from father to sons, or father to daughters, or mother to sons or daughters, we have not statistics at our command to lay down any law on the subject. It sometimes happens that in one family the sons are the sufferers, in another the daughters, but then in others we find some of both sexes breaking down. The outcome of all our investigation is that where there is the tendency, the utmost care should be taken that the union, if any, should be with a healthy and stable partner, one not closely akin, and, on the other hand, not too widely dissimilar. In this way the health and prosperity of the offspring may best be promoted.

Heredity is one of a number of *tendencies* to insanity, or, as they were formerly called, *predisposing causes*. Some other tendencies must now be mentioned.

The Insane Diathesis or Temperament.—Following close upon the study of heredity comes that of the insane diathesis or temperament which has been recognized by many authors. The people who may be described under this head are many in number and very various in character. Among them are all who are denominated "cranks" or eccentrics, differing much from the average members of society and badly adjusted to their surroundings, not so completely out of harmony as to require restraint, but always on the verge of becoming so. They form the large class of borderland cases with whom we are constantly coming in contact and are extremely difficult to treat and bring into harmony with the surroundings of ordinary life. It has been said that this diathesis may be inherited or acquired, and it is true that certain habits, such as drinking, may give rise to peculiar conduct and an impaired mental state; but even here it is always a question whether the drinking habit tself may not have been inherited, either directly from drinking parents or as a neurosis derived from ancestors who suffered from some other neurotic disorder, such as insanity or epilepsy. This temperament may be easily studied in

the characters of the relatives of the insane patients under our care. They are not insane but are peculiar and eccentric. In the fathers and mothers, the brothers and sisters of our patients we may detect the origin or affinity of the symptoms which the latter display. Even the bodily traits, tricks, and contortions are reproduced. A patient of mine had most odd tricks of touching everything with his hands. His father reproduced these or some of them almost identically. The father was never insane but eccentric and a double-first classman. The son was an idiot and another son became insane and died of what may be called pseudo-general paralysis. These eccentrics display conspicuously the predominance of egoistic, or self or subject consciousness, which is seen throughout all who are insane or verging towards insanity. Such egoism is the outcome of a defective mental organization. We recognize it as a sign of approaching insanity when it appears in an individual who has hitherto been free from it, and when we meet with it in these borderland and eccentric individuals we recognize it as a part of their constitutional infirmity.

This egoism or selfishness is exhibited in various ways. It may be mere penuriousness, a desire to accumulate wealth; many devote their lives to this and this alone; their one thought is to get rich and to be richer than their neighbors, and if anything goes wrong, and instead of a profit they make a loss, they take it to heart and deplore their misfortune as if it were utter ruin. Others think to get rich by stinting themselves and those about them in every conceivable way; they will hardly allow their wives and families sufficient for food or clothing, and if they are single, will deny themselves the necessaries of life. Others are characterized by constant suspicion of everything and every one; they suspect their friends, their clergyman, their medical attendant; they go from medical man to medical man trying to test the opinion of one by that of another; they listen to every tale that is told them by servants or to all the gossip of a village, and embitter their lives by suspicious fancies. One lady whom I knew well indulged these suspicions till at last she accused her visitors of stealing things from her drawing-room, so that none would go near her. Gradually she developed undoubted insanity, heard "voices," and died in an asylum. Akin to this is the jealousy which makes the lives of many a constant misery; even among the young it is one of the manifestations of intense egoism; their friends must have no other friends, and they are jealous if any one comes between their special comrades and themselves. In after-life, and especially married life, incredible jealousy is to be found even in those who are reputed sane. Men and women think their wives or husbands are running after others or looking at others, even perfect strangers,

without there being the faintest ground for such suspicion; many a home is thus rendered miserable and the step towards insanity is not a long one, though such insanity is often difficult to certify. Then, too, there are various forms of fear, fear that some one is going to do them an injury, or that something is going to happen to them, and these fears easily grow into delusions. Another form of fear is hypochondria which often merges into insanity. Some think of nothing but health, and are so wrapped up in the task of taking care of it that they do nothing else and neglect business and family in the vain search for remedies for their imaginary ailments. One gentleman I knew who at last would not sign the checks necessary for his daily wants and by his own wish all his affairs were taken out of his hands. These are various degrees and shades of that morbid self-consciousness which constitutes another of the tendencies to insanity.

Sex.—What has the sex of the patient to do with the chance of insanity showing itself? Do more men or women become insane? It is a question not easy to answer and one where statistics are apt to mislead. That females preponderate in our own asylums is certain. In the report for the year 1896 the commissioners give as the number of the officially known lunatics in England and Wales 52,508 females and 43,938 males, and there were admitted into the private, pauper, and criminal asylums during the year 1895, 9,600 females and 9,194 males. These figures are not, however, conclusive. In every asylum there is a larger number of females and an ever-increasing accumulation owing to the lesser mortality. They are much less liable to fatal brain disease; they suffer in far less degree from general paralysis, and also from apoplexy, hemiplegia, and other forms of brain degeneration. Many sink into quiet dementia and in this state live a long life. In most asylums the octogenarian women outnumber the men. Only the statistics of new cases can determine the question with accuracy, and the numbers of those admitted have to be compared with those of our male and female population at the same time. In the year 1895 the ratio of admissions compared with the entire population was of females 6.06 and of males 6.11 per 10,000. Of course many are omitted; in the well-to-do classes a large number of females are kept out of asylums and recover without being registered, especially those who break down after parturition, many of whom recover at home. Against these may be set the large number of males who suffer from general paralysis and are constantly being admitted into asylums, not to live and add to the chronic residue, but to die and be replaced by others. My own belief is that the difference in the number of the two sexes who become insane is not very material. It is quite true that women's nervous condition is one of greater instability

and they are liable to be upset by sexual troubles and such changes as are brought about by puberty, pregnancy, parturition, and lactation, but from the insanity thus caused a large number recover to break down again and thus to swell the numbers registered, not being, however, new cases.

What has marriage to do with the question of a tendency to insanity? According to the commissioners' tables for the five years 1888 to 1892, there were admitted into asylums 3,480 single males and 3,399 single females; of the married 3,559 were males and 3,543 females, while of the widowed 6.70 per cent. were males and 12.69 per cent. females. These are the total numbers which of the single and married approach each other tolerably closely. If we look at the numbers admitted at different ages we shall see that from 15 up to 34 years the number of married females exceeds that of the married males, being 1,097 to 618. But taking the statistics of the entire population we find the same thing, namely, that below the age of 34 the married females predominate, above that age there are more married males.

Age.—In a subsequent section I shall have to describe the varieties of insanity which occur at the different periods of life, the time of puberty, of adolescence, at the climacteric, and in old age. Here we have only to consider whether the age has anything to do with the incursion of mental disorder or the exemption from it, whether there is a tendency at one time of life rather than at the others. For this statistics must be consulted and the information to be gained from them is extremely valuable.

Looking at the tables in the same report of the commissioners we find that in the five years 1888 to 1892, the numbers admitted gradually increased as the age increased up to that of 34 years. Under the age of 15 there were only 323. Between the ages of 15 and 19, 835. Between 20 and 24 there were 1,520. Between 25 and 34, a period of ten years, there were 3,701, while in the next decade (35 to 44) there were 3,609, and afterwards the numbers decline in each successive decade. But comparing the numbers admitted with those of the entire population at the same periods of age, we find that the highest ratio, 11.3, is of those admitted between the ages of 45 to 54. These figures, however, are not to be relied upon as absolutely accurate. They do not take into account all the cases of recurrent insanity which are registered over and over again as if they were new admissions. Neither do they inform us as to the age of the patients when the insanity commenced. Many are not admitted into asylums till long after the date when the first symptoms were noticed, and this specially applies to private patients whose friends have tried

every plan before resorting to an asylum and registration. From every side the figures show that which may be inferred from *a priori* reasoning, that it is not at the time of puberty, great as is the change, nor in adolescence, nor in the decline of the climacteric or old age that people have the greatest tendency to become insane, but, as Dr. Thurnam long ago stated:[10] "The period of life most liable to insanity is that of maturity, or from twenty to fifty or sixty years of age. From thirty to forty years of age the liability is usually the greatest; and it decreases with each succeeding decennial period, the decrease being gradual from thirty to sixty years, and after that much more rapid." Dr. Thurnam's statistics were very carefully compiled and it is possible that they are more correct than the general mass of admissions contained in the commissioners' report. We may take it that the time of the highest development and specialization of the brain centres is that when they are most prone to disorder, the time when an inherited weakness is most likely to assert itself, and when the last and least organized structures are most liable to disturbance and loss of equilibrium.

Civilization as a Tendency to Insanity.—As the time of the highest development in the individual is, as we have seen, that at which he is most prone to become insane, so the most highly developed and specialized among civilized nations will be those in whom mental disease will be most commonly met with. The most lowly developed and savage races of the earth do not keep statistics of the insanity which is among them, but we may be quite sure that in a primitive people who have not been corrupted by the alcohol or syphilis of civilization, insanity will hardly exist, and any idiocy will probably be due to accidents at birth or in early childhood. In such a community the mental state is childlike and undeveloped; the feelings and emotions are of the simplest kind, fear, joy, and grief, not profound nor enduring. Of complicated emotions, ambition, disappointment, pride, intellectual success, religious fanaticism, they know nothing. Their lives are not spent in the amassing of wealth or speculation, and as they do not make fortunes, so they do not lose them. Their bodily wants are few and their lives healthy. There can be no insanity here. In the older civilizations, in China, India, or Japan, there is more, but still little compared with that which is found in western Europe. In China there is no provision for the insane, from which we may infer that there are but few. Dr. Wise[11] attributes the rarity of insanity among the Chinese to their regular manner of life and temperate habits. It is true that they smoke opium, but in spite of all the exaggerated tales of the Anti-Opium Society it is doubtful if they derive the slightest harm from so doing. They drink not al-

cohol but tea, and their food is chiefly rice. Not long ago I was called to the Chinese Embassy to see a commissioner who was in a state of melancholia and reproduced in a wonderful way all the delusions heard every day in our own country from melancholic patients. Under treatment he got so much better that it was proposed to send him home. He was so frightened at the idea of dying at sea and not being buried with his ancestors, that he procured a friend's lump of opium and committed suicide. This gentleman was one of the most highly educated of his day, and had passed all the innumerable examinations of the Chinese; in consequence of his superior attainments he had been sent to England as a commissioner to report on various matters, and the responsibility of this and his long study seem to have been too much for him.

China, India, and Japan are countries whose civilization is of great antiquity, and may be said to hold an intermediate place between the European and that of barbarous tribes. It has been a civilization of very slow development and little change, and therefore has made little demand upon the brain centres of the people. Education in all has existed for ages, but has not extended to the many. The religions, whether of Buddha, Brahma, or Mahomet, have existed without great spiritual excitement, and the lives of the multitude have been simple and healthy. In India the insanity most frequently found is the intoxication of gungah or Indian hemp; otherwise "the Indians in their mosaic offer to us a still unexhausted preserve of primitive psychical life, a mine for those who study folklore, but have not as yet developed true endemic insanity, although we witness endemics of spiritualism, chivalry, and caste, which are influenced by preponderating religious coloring." [12]

In Japan it is probable that the development of civilization and the introduction of advanced ideas and, it is to be feared, the vices of Western nations, will bring about an increase of insanity. The same may be seen among the African negroes in the United States and West Indies. Dr. Bucke[13] tells us that "at the time of the United States census of 1880 among 43,000,000 white people there were 86,000 insane—exactly 1 in 500—while among 6,750,000 negroes, only a little more than 6,000 were insane, a proportion of only about 1 to 1,100." It is to be feared, however, that both there and in the West Indies insanity is increasing among the negro population under the influences of alcohol, syphilis, and religious excitement.

Recurrence.—Among the tendencies which affect those who have already had an attack of insanity must be enumerated the liability to recurrence, which is so constantly brought under our notice. In the commissioners' table of "causes," they give among the physical

causes "previous attacks." It is right that such attacks should be registered, and although they can only be said in a partial sense to be "causes," they often throw much light on the history of the case and are the only assignable cause of the subsequent disorder. That insanity is liable to recur is acknowledged by all. Dr. Thurnam, from statistics founded on the patients in the York Retreat—the asylum belonging to the Society of Friends—states that of 244 cases followed through life 131 recovered from the first attack, but of these only 45 remained permanently sane; 86 had subsequent attacks and 66 died insane. When a man or woman has once been insane, there is a great liability to a recurrence of the malady. We see some in whom the recurrence is frequent. A young lady now under care has had four attacks in eight years. A lady just seen by me had an attack when twenty-seven years of age, and no other till she was fifty and undergoing the change of life.

Exciting Causes.

The tendencies to insanity are, as I have said, frequently called the "predisposing causes," and in contradistinction to these are the "exciting causes," as they are termed, which bring about the particular attack in each individual. A man may be by inheritance prone to insanity, of an insane temperament, highly educated and specialized, and of an age liable to the disease; some slight event upsets his unstable equilibrium, and brings about a pathological condition of his brain centres; but inasmuch as there must have been insanity before it could have been inherited, there must have been pathological conditions which, acquired from outside, left a permanent blemish on the brain centres which was transmitted to the offspring. Some of these origins of damage to the brain cortex must now be examined.

Insanity from Overstrain.

In his Morisonian lectures (1894) Dr. Batty Tuke has closely examined the mental disorder produced by overstrain and has brought to bear on the question the observations and experiments of many authors. From Mosso and others he adduces the fact that hyperæmia of the superior surface of the brain occurs in direct relation to psychical activity, though it is still doubtful how this functional hyperæmia is produced—whether by reflex inhibition of the vasoconstrictor centre, by direct action of vasodilator fibres, or by a combination of the action of the two systems. As to this, something has already been said (p. 6). Roy and Sherrington introduced acids and acid brain fil-

trates into the cerebral circulation, and found that hyperæmia was the consequence. They came to the conclusion that "the chemical products of cerebral metabolism contained in the lymph which bathes the walls of the arterioles of the brain can cause variations of the calibre of the cerebral vessels; that in this reaction the brain possesses an intrinsic mechanism by which its vascular supply can be varied locally in correspondence with local variations of functional activity." [14]

Other observers have established the fact of the alkaline reaction of normal brain tissue and the rapid production of acidity under abnormal conditions, such as the interruption of blood current by pressure on the carotids, and Dr. Milne Murray has demonstrated the rise of temperature incident on chemical changes produced by psychical activity. Moreover, Mosso has shown that fatigue caused by psychical action produces not only a poisonous effect on the general system, especially the muscular, of the person experimented on, but also has proved that blood taken from an exhausted animal and injected into the circulation of one at rest causes indications of extreme fatigue.

Dr. Batty Tuke next adduces the experiments of Dr. Hodge on the effects of electrical stimulation on the spinal ganglion cells of frogs and certain warm-blooded animals, and on the effect of normal fatigue on the cerebral cells of the sparrow, pigeon, swallow, and honey-bee. He found by examination of the cells after stimulation, or after the day's normal fatigue, that there is a marked decrease in size—a change from a smooth and rounded to a jagged, irregular outline, and a loss of the open, reticulated appearance with a tendency to take on darker stains than the nucleus of the resting cell; that in cell protoplasm there is a slight shrinking in size with vacuolation in the cells of the spinal ganglia, and in the cerebral cells a considerable shrinkage with enlargement of the pericellular lymph space of the cells of the cerebrum and cerebellum, and decreased power of taking on stains. The nucleus then becomes darker, deformed, and crenated, both it and the protoplasm lose all power of taking on stains, and the state is one of collapse.

From all these experiments and from the analogy of morbid processes in the kidney and liver, Dr. Tuke conjectures that the morbid condition of the brain is thus produced: "Continuous or frequently recurring excitation or irritation calls for an increase of blood; the function of the vasomotor nerves becomes overstrained; the consequent dilatation of the vessels is maintained by the lessened alkalinity of the cerebrospinal fluid, and the discharge of energy of the cells becomes irregular in consequence of the presence of more blood than is needed for repair, and the discharge takes place at a low level

of cell nutrition and function. If this state persists, the result is active hyperæmia, passive hyperæmia, and congestion. A subinflammatory condition is reached, evidenced by deposits of leucocytes much greater than normal between the hyaline membrane and the muscular coat, by red corpuscles in various stages of degradation, by large masses of pigment, by proliferation of the fixed connective-tissue cells of the vessel, and by exudation."

Concurrently with the hyperæmia there is, says Dr. Tuke, implication of the important functions of the lymphatic system; even slight pathological changes, especially at the vertex, must interfere with the vascular unity of the cerebrum, if they impede the removal of lymph fluid. Continued upward pressure must dam back the fluid by interfering with the patency of the pial conduits, the only relief being found in the action of the Pacchionian villi. Hence in chronic insanity these are commonly found much hypertrophied. Obstruction to the outward flow may also result from the deposit of débris produced by the breaking down of leucocytes, endothelium, and deposits of blood pigment which are apt to collect in the perivascular lymph-space. The drainage being thus obstructed, the cells are subjected to the action of a fluid which is not only as to reaction in an unphysiological condition, but is also loaded with the products of waste.

Such results of congestion are, in Dr. Tuke's opinion, the cause of the early symptoms of the insanity which is commonly known as idiopathic, and is said to be due to *moral causes.*

In a large number of cases the initial symptoms are insidious in character, and physical phenomena are the first to present themselves. These consist of a feeling of fulness or uneasiness of the head, or a dull heavy pain in the occiput or in the frontal region extending to the vertex. There is a general feeling of malaise, the pulse is irritable, not much increased in rapidity, but fuller than normal, and it may gain so much in volume as to assume a "cerebral" character. The first heart sound is often accentuated, the temperature rises slightly at night, the general system becomes impaired, there is disturbance of the digestive organs, and the nutrition of the body suffers. Oxalates or phosphates are usually present in the urine, and in women menstruation is affected. The mental symptoms follow closely. They consist in anxiety, restlessness, irritability, inability to apply the mind to the ordinary affairs of life, a strong tendency to introspection and concentration on self, and sleeplessness. Up to this point it is rarely possible to predict whether the case will culminate in acute mania or acute melancholia. They are both states of excitement of feeling and loss of control, and both may have their origin in the same pathological causation. The naked-eye evidence of mor-

bid action is focussed around the so-called sensory-motor area. In the very large majority of all persons dying insane we find the milky opacity of the arachno- and visceral pia, which is closely associated with underlying morbid processes, present in a space which can be covered by the two hands placed together, the lower ends of the hypothenar eminences covering the spot where the fissures of Rolando meet. Probably the cells in this region are the first to meet with morbid exudates, and restlessness is the indication of the impairment of their activity. The giant pyramidal cells are the first to show marked altered structure, and for this reason we may infer that concurrently with the advance of pathological events in them, what was at first mere restlessness waxes into the excited condition of acute mania or acute melancholia.

It is easy to comprehend that long-continued strain, the strain of overwork or overworry, a long striving after some much-desired object with disappointment at last, will damage the nerve cells just as normal fatigue altered those of Dr. Hodge's animals, disturbing the cerebral circulation or clogging it with products of waste. In this way we convert into physical causes five out of the six moral causes as given in the report of the commissioners in lunacy. The sixth in the list is "fright or shock." This is a cause of a different kind and will include all events which occurring suddenly upset the mental equilibrium. It may be fright at some sight, as a sudden fatal accident, or an accident happening to the individual, perhaps not serious, but causing a sudden shock. It may be a sudden piece of bad news, or something which will effect a total change in the position and environment of the patient. Any of these events may bring about a change in the brain centres and circulation not less extensive than that produced by long-continued work or worry.

We are very apt to think that organic lesion is the cause of mental derangement, and so overlook the fact that mind trouble may cause organic lesion. In the *Journal of Mental Science* (Vol. XII., p. 352) I recorded the case of a healthy young woman, aged twenty-four, who one day met her sweetheart at the British Museum walking with another girl; a violent scene ensued, the young man tearing a brooch with his portrait out of her shawl. Next day she fretted much, and the following day was maniacal. She then fell into a state of stupor and was admitted into a hospital on the fifth day after the quarrel. "She evidently heard and saw, but all the mental faculties were suppressed. No paralysis. She was noisy all night. Next day she was delirious, constantly talking, not answering when spoken to. On the third day after admission she suddenly became comatose and died. In the left hemisphere was found a very large recent clot,

estimated to weigh at least an ounce." Here such a strain is put on the cerebral circulation that a vessel actually gives way in a healthy young woman of twenty-four.

Shock or fright may produce rapid results as in the case just mentioned. On the other hand, though the shock may be sudden, the consequences may be long delayed, and then we have a condition allied to that produced by long-continued worry. The patient's mind is continually brooding over that which has happened, sleep is broken, and gradually the damage thus done to the cerebral centres makes itself seen. When the brain is rapidly reduced, very acute symptoms are liable to follow. "The peculiarity of the exciting cause appears to be not its psychological characteristics, but its intensity and rapidity of incidence, the latter depending not only on the former, but also on the stability or instability of tissue. According as excitement of feeling is rapidly produced, so the more likely is mania to be the symptom occurring in consequence of the action of abnormal arterial hyperæmia and its immediate consequences" (Batty Tuke).

There is a long series of cases contained in the works of foreign authors which may be called "traumatic hysteria" or "traumatic neurasthenia," the result of railway collisions or other accidents. The symptoms, however, are hardly those of insanity, nor do the patients require to be treated as insane.

Sexual Excess and Self-Abuse.

In the commissioners' last report the average number of patients whose insanity was assigned to these two causes was of males 257, and of females 75 out of a total of 8,289 male and 8,797 female patients. Whereby we learn that such excess is far more prejudicial to men than to women, the cases assigned to it as the cause being much more numerous among the males. It is a difficult cause to investigate with anything like accuracy, as that which is excess in one may have little effect in another. In a weakly individual with an unstable nerve organization, the constant excitation of sexual orgasm, whether in the shape of self-abuse or copulation, must have a damaging effect on the brain, producing in all probability the same result upon the nerve cell as fatigue or overstimulation. I have known epilepsy follow the indulgence of a newly married man and disappear under proper restriction. This pointed to an explosive condition of the centres, a condition of greater instability than that of the man in whom mental disturbance only is produced. These cases may fitly be ranged under the section of insanity from overstrain.

Insanity from Physical Causes.

Insanity from Epilepsy.

The connection between epilepsy and mental disorder is of great consequence and has been carefully studied by many physicians; especially I would refer to the writings of Hughlings Jackson in the West Riding Asylum reports, Vol. III., and other journals. Epilepsy, like alcoholism, may occur without causing any appreciable mental disturbance. As a man who has been very drunk becomes perfectly sane when sober, so another may have an epileptic fit and after a sleep wake sane. Like alcoholism, epilepsy may produce in time mental enfeeblement and dementia; loss of memory will be a prominent symptom in both, with inability to fix the thoughts on a subject, or execute anything requiring application and attention. But, also like alcohol, epilepsy may give rise to insane reductions, to melancholic depression, to wild attacks of mania, to delusions and hallucinations or to alterations of the moral conduct and habits of the patient. The varieties of the symptoms are endless, and it is very evident from this fact that the seat of the primary discharge from the cortex must vary also. As Dr. Jackson says, "From this it follows that there is, scientifically speaking, no entity to be called epilepsy, but innumerable different epilepsies as there are innumerable seats of discharging lesions. And as the first symptom in the paroxysm is the first effect of the discharge of the unstable centre, any two paroxysms beginning differently will differ throughout, however little." A mental change will be observed in many epileptics prior to a fit or succession of fits. This change may be marked by some delusion or hallucination, by a failure of mental power and inability to follow an occupation, by great depression of spirits or the reverse, exaltation and excitement, and often there is great irritability or ill-temper. On the other hand, I have known patients who seemed at their best just before an attack, with minds clearer and more capable than at any other time.

The attack itself may be ushered in by auræ of the special senses, of the visceral or organic sensations, or intellectual or psychical auræ, and the epileptic attack will differ according to the severity of the motor or the mental implication. After the paroxysm we find an endless variety of mental disturbances, all depending on the portion of the cortex which is discharged. Sometimes it happens that very violent maniacal excitement will follow even one slight attack of *petit mal*, an attack which the friends have overlooked or know nothing about. The so-called nocturnal epilepsy is of this kind, and may exist

for a long time without being suspected if the individual sleeps alone, for of such fits, whether they be *grand mal* or *petit mal*, he is quite unconscious. Possibly attention may be drawn thereto by a bitten tongue or a wet bed, but often nothing is known and wild excitement will follow one of these attacks without its cause being recognized. It is well known that the recurrence of the slight attacks of *petit mal* are more likely to impair the mental condition than the severe paroxysms, and in my experience they are harder to cure.

In a patient insane from epilepsy it is usual for a fit or succession of fits to be followed by an attack of maniacal excitement, which may be of all kinds the most dangerous and furious. This mania continues for a varying time, and then passes off, leaving the patient much as he was before, but recurring with each attack. Such people require the care of an asylum, but it sometimes happens that if the paroxysms are not frequent, the mind may be so far restored that a question arises whether they can legally be kept longer in restraint. This is a difficult point, and must be decided by our knowledge of the interval between the attacks and the nature of the maniacal excitement or violence which succeeds. We must be guided also by the prospect of the care or want of care which the patient is likely to have when he leaves the asylum. If the fits cease altogether, the mental health may be restored, even after many years. Dr. Whitcombe relates[15] the case of a woman who had had fits since she was nine years old and was admitted into an asylum at the age of thirty in a "state of total imbecility, unconscious of everything and every person about her." Twelve years afterwards she suffered from an attack of acute rheumatism, followed by chronic rheumatic arthritis, for which the left leg was amputated. At the time of the acute attack the fits ceased, and three years after "she was bright, cheerful, and happy, rational in conversation and constantly employed."

From the observations of Hughlings Jackson on the epileptic discharges we turn to the pathological researches of Bevan Lewis. "The morbid histology," he says, "is confessedly an obscure question if we confine our attention to those seizures in which coarse brain disease and naked-eye changes are not appreciable. There exists a widespread community of opinion that the pathological anatomy of epilepsy, whatever it be, is the expression of a grave nutritional disturbance of cell protoplasm, a nutritive disturbance which need not express itself in palpable morbid change even to the higher powers of the microscope. From this opinion, however, we must dissent; for it appears to us that a morbid appearance of the cortical cell does exist of a highly characteristic nature when the cortex is the subject of careful examination by the *fresh method* of research.

"The essential nature of epilepsy is that of an abnormal discharge of nerve force from the higher cerebral centres in the cortex. A nutritive irritability underlies the morbid activity, and invariably expresses itself in some one or other morbid change recognizable in the structural elements of the cortex. In cases of epilepsy in which mental disturbance predominates and actual insanity coexists, we have a notable affection of a special series of cells, not exclusively seen, however, in this disease, for it prevails likewise in other convulsive affections such as chronic alcoholism, wherein spasmodic discharges of nerve energy are frequent." This consists of changes in the small nerve cells of the second layer of the cortex commencing in the nucleus.

Alcoholic Insanity.

That alcohol plays an important part in the causation of insanity, even at the present day, is, unfortunately, certain. In our own country its effects are to be studied among the lower classes, or the males of the lower classes, rather than among the higher; but in the latter there are still plenty of examples, both male and female. The two sexes are not affected in the same manner. Acute alcoholism in the shape of delirium tremens is rarely found in women, who have a comparative immunity from this as from general paralysis. We can study the effect of alcohol from the heightened circulation, rapid talking, and increased vivacity of the man who has had a moderate amount of wine to the symptoms of poisoning, the tottering gait, thickened speech and incoherent ideas of him who has had too much. It is a common remark that every symptom of insanity may be produced by drink. Some men when drunk are maudlin and melancholic, some are furious and may commit homicide or suicide. The effect of acute drinking is to produce in many the delirium which we call *delirium tremens*, which may abound in delusions and hallucinations of sight and hearing, with great tremor of the limbs, almost amounting to palsy, but which subsides when the poison is eliminated, the patient recovering in a week or so and being entirely restored to health in mind and body. If such attacks are not very frequent, a man may have them during a period of many years without permanent damage. But there are two other forms of acute alcoholism. Some men are for the time mad-drunk and may in this state be very dangerous to themselves or others. This state is not delirium tremens, and it will subside in twenty-four hours if drink is entirely stopped. And there is also an acute or acute delirious mania which is more prolonged than delirium tremens and has not the tremor. This, too, will pass away if alcohol is withheld, though a longer time may be required. Treatment at home rather than removal to an asy-

lum should be tried in all these forms, if it is possible to carry it out with safety. The very acute symptoms are generally of brief duration and subsequent measures can be adopted if necessary.

Chronic alcoholization produces mental disorders of various kinds, ranging from mere alteration of conduct and troublesome or vicious behavior to the most complete dementia with total loss of memory and extinction of mind. The diagnosis of the first is often extremely difficult. We may be certain that the individual is altered and altered for the worse, but may have doubts whether the alteration amounts to insanity for which he should be restrained in an asylum, though at present owing to our defective legislation we have no other mode of compulsory detention. Some rapidly recover when drink is withheld, and this adds to our difficulty, because when a man is placed in an asylum and beyond the reach of drink, the insanity of conduct is not apparent. There is mental improvement on the one hand, and no opportunity of displaying such conduct on the other, so after a brief sojourn the patient comes out to return to his drink and quarrel with all his friends. Alcohol produces in others much more marked insanity, delusions of every kind, delusions of persecution, conspiracy and suspicion, and not only delusions but hallucinations of hearing, taste, and smell, visceral hallucinations and perverted sexual feelings and instincts. Such patients may be as dangerous as any class, both homicidal and suicidal. Their brain is damaged by the long-continued drink and does not recover, as a more healthy organ may be expected to do. Sensorial and motor troubles give rise to delusions concerning the body and fancies of electrical wires and machines. Tingling and pricking sensations cause ideas of insects crawling on the skin, or snakes gliding over the limbs, while motor difficulties bring about corresponding beliefs that the patient is practised upon by unseen persons or some mysterious agency which has taken away the power from his legs and weakened him everywhere.

This delusional insanity is much more common in men than in women, the symptoms produced in the latter by continued drinking being in very many cases sudden loss of memory. I have known this come on in twenty-four hours in a woman who had been for years a hard drinker without becoming absolutely drunk. Every degree of forgetfulness will be found, recent matters, names, dates, and events passing away almost immediately. Here we have the nerve centres damaged and changed by the long-continued poisoning; the nerve cells and fibres are degenerate and inefficient. Patients are often quite conscious of the defect, and appeal to those about them for the answer to our questions or beg us not to ask them. Total abstinence, rest, and food may restore the memory to a considerable extent,

though it is doubtful if the mental powers are ever quite the same. It may, however, be so far restored that a question may be raised as to the legal capacity or incapacity of the individual, and either the one or the other may be difficult to prove. The power of recollecting will vary much from day to day, and even according to the hour of the day; and if the patient is tested not as to current events, but as to what happened years ago, he may acquit himself very creditably and his forgetfulness of the present may be minimized.

Another constant symptom, also depending on the degenerate condition of the cortex, is a loss of motor power, which, as Bevan Lewis says, is not incoördination or ataxia, but commences with a fine muscular tremor affecting first the fingers and hands and spreading up the arm, then involving the tongue, lips, and articulatory muscles, and lastly extending to the foot and legs.[16] Muscular twitching of the face, tongue, or head will also be noticed, and muscular spasms and cramps and epileptic or epileptiform convulsions with a certain amount of paralysis not infrequently appear in the course of the drinking. All this will be alleviated if drink is withheld, and recovery will ensue to a wonderful extent. I have known a lady admitted to an asylum with the most complete paralysis of the lower extremities and sphincters and equally complete amnesia. She walked out of the institution in a comparatively short time restored in mind and body. Needless to say, she went back to her former habits, and in the next attack she died.

Andriezen has very carefully analyzed[17] the clinical symptoms of this insanity and has compared them with the pathological changes discovered by him in the brain tissues of alcoholic patients. He divides the symptoms into seven main groups. (1) The first is a diminished power of recollection—of recalling past memories of things seen or heard, such power implying a highly evolved cortical organization and the integrity of the latest evolved and elaborated anatomico-physiological connections between the nerve cells in the nutrition of each individual cell. He describes both external and internal changes in the fibrils which form the conjunction between the nerve cells. They become granular and wrinkled in outline instead of being fine, delicate, and smooth, and internally are streaked and irregular when stained, indicating chemical changes. Commencing trophic changes in the cell bodies are also noticed, pointing to increased functional activity, which is productive of a degradation and increase of pigmentation, the replacement of living protoplasm by non-living pigmentary product. (2) The next symptom is a diminished faculty of attention and volition. This is a more advanced defect; even when the objective images are present, the capacity of receiving and regis-

tering them in the mind is diminished. "Volition is a development from attention and passes on to execution, being thus the passing from attention to execution; in the brain it overlaps the psychomotor sphere on the one side, and the sensory on the other; its region is, therefore, the transitional or association system between the two." And the pathology of this defect is, according to Andriezen, a commencing nutritive degradation of the nerve cells which discharge down the pyramidal tract, inciting thereby the motor cells of the cord. (3) As the result of the above-mentioned changes we find diminished initiativeness and energy in conduct, and (4) diminished muscular power, trembling, together with (5) a blunting of the higher moral and ethical sense. (6) We also have insomnia, a loss of capacity for sleep and recuperation. Here we may apply that which has been already said concerning the effects of fatigue on the brain cells as evidenced by the experiments of Hodge and the researches of Batty Tuke and of Mann, the latter proving beyond a doubt that a series of changes are present parallel to those described by Hodge.

Finally, we come to the seventh stage. (7) Melancholia with suspicion, vague dreads mixed with phases of momentary excitement, and finally with acute hallucinations and delusions, maniacal excitement, delirious conditions and epileptic fits, from which, if relief is obtained, a permanent residuum of weak-mindedness is left behind, or chronic mania or systematized delusional insanity. The earliest in this group is melancholia, with vague and general suspicions, intensified at moments by distinct hallucinations of the senses. This, the seventh stage, is one of bad omen. It indicates not only a serious progress of the mischief beyond the limits of repair, but is often the beginning of a downward progressive stage. Pathologically, considerable extents of cortical tissue have by this time been damaged beyond recovery. There are points of softening and breaking up in the molecular and submolecular nerve protoplasmic plexuses, and a more notable involvement in the subpyramidal region, with pigmentary and fatty degeneration of nerve cells, and also a vascular disease, endoarteritis and fatty changes, narrowing of the lumen of the vessels with the sequelæ, imperfect nutrition of the brain tissues, thrombosis, and focal softening. There are also changes, softening and swellings, in the neuroglia elements themselves.

In studying the pathology of the insanity of alcoholism, it is to be remembered that recovery takes place at many stages of the disorder. There is the acute insanity often amounting to acute mania or acute delirium which arises as the result of a bout of heavy drinking, and occurs chiefly in men. In this, which we know as delirium tremens, the pathological condition must be closely allied to that of

the form of acute insanity just mentioned. The symptoms are quite different from the melancholia with suspicion, which characterizes chronic alcoholism, and they differ on the other hand from acute mania in that they commonly last only a few days, the whole disorder running its course in about a week and terminating in death or recovery in that period of time. It is manifest that this insanity is due to the action of the alcoholic poison upon the brain, but what are the structures or tissues affected thereby? The researches of Bevan Lewis, Andriezen, and others have been directed to the morbid anatomy of chronic alcoholism and the changes produced by long-continued drinking, but these are not the conditions of the brain in delirium tremens. In this disorder a patient is one day violently delirious with delusions and hallucinations of many kinds; he has had no sleep for days, and there is great fear that he will die. Yet sleep comes; either because the poison is eliminating or through the agency of drugs he sleeps many hours and awakes sane, every trace of the insanity having vanished. It is clear that some tissue of the brain is poisoned by the alcohol, and that when the latter is got rid of the brain function is restored. I recollect a very successful practitioner who used to treat delirium tremens by brisk purgation in order to get rid of the poison, and his patients certainly did well. The acute symptoms indicate here, as in acute delirium, active hyperæmia and excessive vascular action as evidenced by the total want of sleep, and it appears likely that the tissues paralyzed are the vasomotor which control the cerebral vessels; about them we at present know little, but they are probably the nerve cells themselves which regulate the blood supply of the cortex.

Insanity from other Poisons.

Indian Hemp, Hasheesh, or Bhang.—This is a fertile source of insanity in the East or wherever Orientals are gathered together. The drug is enjoyed in various ways, either by being smoked or taken into the stomach. When I was lately in the island of Trinidad, where there is a large coolie population, I found that none could be imported nor the plant grown under heavy penalties. The last report on the subject is from Dr. Warnock, the superintendent of the asylum at Cairo, who says that of 253 admissions in the latter half of 1895, 40 were put down to the abuse of hasheesh and 40 more to the combined effect of this drug and alcohol. Of 80 cases only 5 were women. In 41 per cent. of all his male patients hasheesh alone or combined with alcohol caused the disease, while this was the case in only 7 per cent. of the females. His conclusions on the subject are, first, that in quite a considerable number of cases hash-

eesh is the chief, if not the only cause of the mental disorder. Secondly, he does not think that hasheesh insanity can at present be diagnosed by its clinical characters alone. Many hasheesh patients recover almost immediately on their admission, an abstinence from the drug being in such cases followed by a cessation of the morbid symptoms. Dr. Warnock gives three types of this insanity: 1. Hasheesh intoxication—an elated, reckless state with optical hallucinations and delusions. Sometimes there is delirium, milder and less aggressive than that of alcohol, with none of the ataxic symptoms, recovery taking place in a day or two. 2. Acute mania with terrifying hallucinations, fear, continual restlessness and talking, sleeplessness and incoherence. These cases last some months and do not always recover. 3. Weakmindedness, with acute outbreaks after each hasheesh excess. They are quiet and well-behaved while under restraint, unconcerned and lazy. When discharged they return to the drug and come back in an acute state. In 1893–94 an "Indian Hemp Drug Commission" reported that of the whole number of cases admitted to asylums in India in 1892, only 7.3 per cent. were ascribed to hemp drugs, and in the opinion of this committee hemp drugs cause insanity more rarely than has popularly been supposed.

Opium.—That the excessive abuse of opium produces mental symptoms which amount to insanity is beyond question, yet it is not common, at any rate in this country. In the East opium is largely smoked and the growth of the poppy and sale of opium are the source of a never-ending controversy. In the West we have to deal not with the smoking of opium, but with the taking of morphine, either by the mouth or, what is now more common, subcutaneous injection. In many cases this amounts to a veritable morphiomania, and the patients are reduced to a condition of great weakness of mind with complete loss of moral sense, so far as the habit is concerned. They become untruthful, artful, will deceive their friends and medical attendants, and will obtain the drug by any means, in this resembling the victims of alcoholic intoxication. In certain cases there may even be symptoms of insanity, delusions of persecution, mania with exaltation, mental weakness, and loss of memory. But such symptoms are rare even in morphine maniacs, and morphine may be taken for years and a habit engendered without the mind being seriously affected beyond the loss of *morale* already spoken of. The great difficulty in treating such people, which exists also in the case of the alcoholic, lies in the fact that the mind is not so impaired as to constitute legal insanity; consequently they cannot be secluded and restrained under the complete control which alone gives us a chance of reforming them and breaking the habit. I have known a patient who

used the hypodermic syringe for years, and eventually died of the results of morphine, yet beyond the loss of *morale* as regards this he presented at no time any mental symptoms. The effects of opium-smoking also are greatly exaggerated. Competent observers tell us that the victims of it such as we read of in sensational novels are only the exceptions, and that in China opium is smoked in moderation by thousands who are hale and hearty and enjoy excellent health. There is an immense difference between the results of the continual use of opium and alcohol. The various methods of treatment of morphiomania are by sudden, quick, or slow deprivation. Sudden deprivation I look upon as dangerous, for it often produces alarming symptoms of collapse, diarrhœa, sneezing, and delirium. Quick deprivation is the best, but it must be conducted under close supervision in a suitable home. I have known some who were unable to bear total abstinence from the drug.

Lead.—The poison of lead is an unquestionable cause of insanity in some who are exposed to it, and the physicians of our public asylums have recorded cases from time to time. In the *Journal of Mental Science* (Vols. XXVI. and XXXII.) numerous cases are mentioned with various symptoms by Drs. Rayner, Robertson, Savage and Atkins. That long-continued poisoning by lead will produce a degeneration of the nerve tissues with motor and mental trouble is to be expected, and it is probable that the symptoms will be similar to those of chronic alcoholic poisoning, and also those of general paralysis, for some patients have been looked upon as general paralytics till the blue line and history proclaimed the true nature of the disease. Dr. Rayner speaks also of cases of protracted lead intoxication by minute quantities producing slowly-developing sensory hallucinations, shown by the absence of the feeling of persecution and the persistence of hallucinations of sight. And he also records others in which the poisoning developed gout in the first instance, and later the gouty and lead poisons appear to have united in their action on the nervous system and given rise to mental disorder closely resembling general paralysis. Dr. Robertson relates several cases in which besides nervous symptoms the sight was affected. One patient, a girl of fourteen, employed in some dye works was delirious for some weeks. She became calmer and reason returned in about two months. Sight, however, was irretrievably lost, both optic discs being in a state of white atrophy. The restoration of the mental powers appeared to indicate that the higher centres of the hemispheres were not damaged beyond recovery. Dr. Savage narrates the case of a man who had been handling lead for three or four months, and that of a girl whose maniacal symptoms followed vaginal injections of lead lotion.

These two patients recovered, the poisoning not being of long duration. When it has continued for years and produced degenerative changes, the prognosis is extremely unfavorable. The few cases I have myself seen were characterized by melancholia of an ordinary type.

Insanity and General Diseases.

Syphilis.

That syphilis produces changes in the brain is now conceded by all. These changes, however, do not, it is said, affect the nerve tissues—the nerve cells and fibres—but only the neuroglia, vessels, meninges, lymphatics, or bone, the nerve structures being affected secondarily through obstruction of the vessels and starvation or pressure caused by syphilomata or hypertrophy of the neuroglia or fibrous tissue. Dr. Clouston[18] narrates some striking cases of "vascular syphilitic insanity." One man, twelve years after he had contracted syphilis, became insane and never recovered. He became subject to regularly recurring convulsive seizures; after some years there were general weakness, partial paralysis of the left side, and thickness of speech. Then with enfeeblement and loss of memory he passed into stupor and died, twenty-five years after he had contracted syphilis. On examination the calvaria was condensed, the dura thickened and adherent to the bone and pia, and the latter to the convolutions. A great part of the centre of the anterior lobe of the right hemisphere and many of its convolutions were atrophied. There was hypertrophy of all the arterial coats and every form of irregular local arteritis.

Dr. Clouston also mentions some extraordinary cases in which, as the result of slow syphilitic arteritis, the whole of the white substance in the inside of the anterior and middle lobes, lying between the outside convolutions and the central ganglia, had gradually and entirely disappeared leaving the grey matter intact. This is due to the different mode in which the grey and the white matter are supplied with blood and the much larger quantity which the grey receives. Syphilomata cause brain and mental symptoms of varying character, which may give way to treatment and the patient recover. There is evidence in them of coarse disease, but there are other cases which are of more doubtful pathology when a patient becomes insane after having contracted syphilis either recently or some years previously. The mental symptoms may be those of ordinary insanity, mania, or melancholia, with or without delusions. There may be symptoms of secondary syphilis, or these may have long passed away. It is conceded that these patients are persons predisposed to insanity. Does

the fear of the disease bring on the insanity, or is it due to the effect of the syphilitic poison? Dr. Clouston is of opinion that it is due to slight brain starvation from an obscure syphilitic irritation. It may also be due in the early stage to a poisoned and deteriorated state of blood, and so to malnutrition of the cells.

Authors are not agreed as to the precise way in which the mischief is brought about, and such an authority as Bevan Lewis excludes syphilis altogether from his category of causes. Many cases of general paralysis occur in those who have been the victims of the disease, and there are also cases of so-called pseudo-general paralysis which closely resemble the true. Here antisyphilitic treatment will now and then arrest the decline and lead to the belief that a case of general paralysis has been cured. In cases of undoubted general paralysis I have never seen such treatment do any good but often great harm. That syphilis produces ordinary curable insanity, mania, or melancholia is very doubtful. The commissioners in lunacy give 4.9 as the percentage of cases caused by venereal disease, and these probably were all cases of general paralysis. One hears of syphilis in melancholia because many imagine that they are suffering from it, even those who have never had any trace of the disease, while others who have contracted it and have long been cured, or who have had gonorrhœa only, will cling to the delusion that they are still suffering from syphilis and will point to every spot on their bodies in confirmation of their fancy. All these delusions are gloomy ideas which are due to the melancholia and not to syphilis. Just as one patient imagines that he has the leprosy of the Old Testament, so another will think that he has syphilis; but when recovery takes place the delusion passes away, and to order anything like antisyphilitic treatment would be more likely to encourage and confirm than to dispel it. I lately saw a young man in a state of mania from which he rapidly recovered; he had the typical pegged upper median incisors, and had always been of somewhat weak mind, but though he was evidently the subject of congenital syphilis, he had not himself contracted the disease. Congenital syphilis is the cause not of insanity, but of idiocy, juvenile dementia, and nervous affections of many kinds. The prognosis in all whose mental powers are affected is extremely unfavorable.

Rheumatism.

There appear to be cases in which an acute attack of rheumatism gives rise to mental symptoms which may vary greatly. Dr. Clouston draws attention to the connection between chorea and rheumatism, and mentions two patients in whom acute choreic insanity followed

rheumatic pain and swelling, and continued with high temperature for some time. The connection between chorea and rheumatism is a much argued question. There seems great reason to doubt the theory that the former is produced by means of emboli derived from the heart and affecting the corpus striatum.

That chorea follows rheumatism sometimes is certain, but it often occurs in cases in which there has been no rheumatism, and there are many in whom mental symptoms have supervened upon rheumatic without anything in the shape of choreic movements. We know that after any acute disease accompanied by a high temperature, mental symptoms not infrequently appear, as in the so-called post-febrile insanity, of which I shall have to speak. It is not surprising therefore that after acute or subacute rheumatism the brain should be affected, especially when there is a cessation of the pain. It seems clear that we have a transference to the brain of the rheumatic poison just as we have of the gouty, a transference which causes hyperæmia and interference with the mental function, the latter shown either in dulness and inability to attend to ordinary occupation—to a moral change or in the more acute symptoms of mania or delirious mania. The mental symptoms, though very marked, are not attended by the feverish condition which may have preceded them, and this shows that it is not the fever alone which causes the mania. The temperature in the latter follows the course of that which we find in ordinary insanity, ranging from the normal to 100° or 101° in very acute cases. As in post-febrile insanity, the temperature is lower during the insanity than it has been previously during the febrile attack. The patients will be found in both cases to be persons prone to neurotic disturbance, whose brain has been thrown off its balance by the febrile condition. That there is a transference of the rheumatic poison seems probable from the converse. I was summoned to see a woman who was in a condition of very acute melancholia with refusal of food. Her friends would not allow her to be removed, being fully persuaded that she would die, and this seemed a very probable result. I sent a nurse to them who in a few days returned, the case having, as I supposed, terminated fatally. It was not so, however; in some forty-eight hours acute pain and swelling appeared in the hands and elbows, and the mental symptoms vanished at once. As in post-febrile insanity recovery usually follows the mental disturbance which is the sequel of rheumatism.

Gout.

Writers describe the insanity of gout as distinct from that which is associated with rheumatism, but there must be a very close connection between the two, just as we see cases to which is given the

name of rheumatic gout, in which the near relationship of the two diseases is manifest. Gouty people are proverbially prone to mental disturbance, to irritability and instability of brain and nervous system. We know how mental causes will give rise to an attack of gout; men who are most temperate in their lives will get it after they have been subjected to great mental strain or severe shock, to one of the causes, in fact, which may produce in another symptoms of insanity. The brain, which thus acts on the general system and gives rise to the phenomena of gout, is sometimes affected by the disease and its stability is upset by a reflex or transference of the gouty disorder. The alternations between the two have been noticed by many writers. Melancholia, sometimes of long duration, has passed away on the occurrence of acute gout, and, conversely, anything which has caused an attack of gout to suddenly disappear, as exposure to cold, has been followed by pronounced mental symptoms. Dr. Garrod gives several instances of this. Also it has happened that strong antigout remedies taken for the purpose of staving off an attack have produced violent mental symptoms, just as in epileptics we sometimes see acute mania follow the administration of bromide, which has caused the cessation of the fits. When these recur the mania subsides. The cases of so-called *suppressed* gout are those in which the mental symptoms disappear when the severe joint attacks make their appearance.

Sunstroke.

I see a number of Indian officials, civil and military, and a few ladies, who after residence in that country become insane, and a large number of these are said to have suffered from sunstroke. Sunstroke, in the strict meaning of the word, implies a sudden collapse owing to the direct rays of the sun, and this is not a common precursor of insanity. Heat-stroke is a better name than sunstroke, for that which causes the mental disturbance in so many is the protracted exposure to heat, day after day and night after night, in the hot season. So far from the insanity being due to the sun's rays, it is probable that the heat at night has more to do with it than the heat at noon, for healthy, sound, and natural sleep is prevented or marred by the high temperature, and I have had a vivid description from a lady of the sufferings and mental troubles she experienced at night in a hot station. In many cases permanent damage may be done by the sun. "The most abiding results of sunstroke," says Dr. Hyslop,[19] "are all referable to impaired functional energy of the cerebrospinal system, and this impairment shows itself either in motor paralysis, sensory paralysis of common or special sensation, hyper- and dysæsthesiæ of the nerves of common or special sensation, in debility and undue ex-

citability of the emotional centres, and in similar states of the cerebral hemispheres and spinal cord; or, more commonly, in some nervous defect or perversion consisting in a functional paralysis of one or more of the great nerve centres." Sir Joseph Fayrer tells us[20] that the condition of sunstroke is intense pyrexia due to vasomotor paralysis and to the nerve centres being overstimulated and then exhausted by the action of heat on the body generally. The exposure to the sun may bring about not only mental but cerebral changes which may simulate those of general paralysis. I have not seen many cases of undoubted general paralysis in Indian officers, but the physical symptoms may make us suspect it. It is not to be forgotten that with the heat of India may be combined the effects of syphilis and alcohol, and when physical symptoms of cerebral disease coexist with mental, the diagnosis and prognosis may be complicated in this manner. I have seen many, however, in whom the disturbance was purely mental and passed off when they left India, sometimes before they reached England. In some recovery has taken place only after a considerable period, yet in these uncomplicated cases the termination has almost always been favorable. Then arises the question, Shall the patient return to the tropical climate? Many are anxious to do so, for to many it is of great importance on account of length of service, pay, or pension, but it is most unwise of them to make the experiment, and we should try and dissuade them; few can stand the heat again any more than they can tolerate the effect of alcohol, and their return is usually followed by a rapid break down.

Anæmia.

There are many cases of insanity which appear to be due to an impoverishment of the blood and an alteration in the quality rather than the quantity of that which has to nourish the cells of the brain. This impoverishment may be due to starvation and privation or to some cause which affects the blood itself. The form of insanity produced in this manner is chiefly, as might be expected, melancholia, which is usually associated with a failing strength, whatever the origin of the failure.

In the *American Journal of Insanity* (Vol. XLIX., 604) Dr. Whitmore Steele has recorded observations made by him in thirty-five cases of melancholia, which showed a decrease in the corpuscular richness and a deficiency in the percentage of hæmoglobin, and he also gives the results of a systematic tonic treatment and the mental changes that were coincident with this alteration. For counting the corpuscles he used the Thoma-Zeiss hæmocytometer, and for estimating the percentage of hæmoglobin the hæmoglobinometer of

Fleischl. In most of the cases the blood was examined between four and five hours after meals and, as a rule, in the morning. He gives a table of the thirty-five cases showing the age and weight of the patient before undergoing treatment, the amount of hæmoglobin per cent., and the number of red corpuscles, and the figures denote a marked anæmia in most of the cases and an average percentage of red corpuscles and of hæmoglobin much below the normal. He also examined at the same time several cases of acute mania and found that, although the corpuscular richness was less diminished, the amount of hæmoglobin was reduced to about the same percentage as in the melancholic patients.

Of the thirty-five cases twelve were selected and put upon special tonic treatment, consisting of the administration to some of cod-liver oil, iron in the form of an elixir of iron, quinine, and strychnine, while to others with an irritable stomach was given an elixir of the citrate of iron in ten-grain doses three times daily. These patients having been kept on tonic treatment with nutritious diet and under good hygienic conditions for a period of six weeks, their blood was examined and the results recorded. It was seen that in about fifty per cent. there was already some improvement, slight in some, and going on to complete recovery in others. In some which showed no improvement at the time of the second examination the mental symptoms improved subsequently and convalescence followed. Another observer, Dr. Macphail,[21] found a very marked deterioration of the blood in melancholia, but not so great as in the cases of Dr. Steele. The conclusions of the latter are: 1. That in melancholia, both acute and chronic, there is a very marked deficiency in the number of hæmocytes, in very few cases the percentage even approaching the normal, and that the percentage of hæmoglobin is reduced in like proportion; 2. That a number of cases showing considerable crenation of the hæmocytes at first are found to be much less crenated after tonic treatment and the mental improvement following it; 3. That a systematic tonic treatment is found markedly efficacious in the treatment of this form of mental disorder.

Insanity and Kidney Disease.

That kidney disease is a cause of insanity can hardly be maintained by any alienist. It is most unusual to meet with any evidence of kidney disease in recent cases admitted into asylums, and at any rate in my own experience there has been a surprisingly small amount of albuminuria or glycosuria. Of the two I am inclined to think that the latter has been the more frequent. Dr. Savage says "it is not common to meet with albuminuria in acute cases of insanity, and I

may say this after examining several hundred specimens of urine of the insane." A curious case of a lady, aged sixty years, is now under my observation. In the year 1868, after her first confinement, she had an attack of melancholia which was tedious, a twelvemonth elapsing before she was quite well. In the year 1883 she had a second, which passed off in six months or less. In 1893 she had a third, but on this occasion the urine was enormously loaded with albumin, which I was informed had been its condition for some time. She was apparently in good bodily health and was quite unconscious herself of there being anything the matter with her kidneys. She made a good recovery from the melancholia and went home in excellent spirits in about six months, the albumin remaining the same and there being an entire absence of kidney symptoms. In less than a year, however, she again became melancholic, and this has now continued for nearly two years and a half, there being at present some improvement but not recovery. The albumin has remained throughout in nearly the same amount, but without any symptoms and without any special treatment. In this case the albuminuria and the melancholia appear to have no connection. She had two attacks prior to the appearance of the former, and recovered from a third in spite of it. The extraordinary part of it is that she should excrete so large an amount of albumin without any failure in health. There must be a considerable portion of the renal structure still intact.

The cases of insanity with Bright's disease which have come under my notice have been but few and have been in persons broken and weak in health and, as might be expected, have been all of the melancholic type. Dr. Alice Bennett, the medical superintendent of the female department of the Morristown Asylum (Pennsylvania) has recorded a series of sixty cases[22] of insanity as a symptom of Bright's disease, which are most interesting and valuable. Twenty-four of the patients died, eleven recovered, many remained stationary or were gradually declining. We are told that although the symptoms varied, the most constant one was "some form of mental pain ranging from simple depression through all degrees and varieties of delusions of persecutions, self-condemnation, and apprehension, with or without hallucinations, up to a condition characterized by a frenzy of fear with extraordinary motor excitement and rapid physical prostration, the 'grave delirium' or 'typhomania' of some authors." Dr. Bennett's report bears out my own experience that the insanity in this complication is usually melancholia.

Dr. Hubert Bristowe has found in the records of the Somerset Asylum a large percentage of cases of general paralysis in which the post-mortem examination has revealed granular disease of the kid-

ney.[23] He found that of 75 cases only 9 were free or apparently free from renal disease. Of 66 cases 51 had well-marked granular kidneys, and the other 15 had diseased kidneys which were most probably granular, though in a less advanced degree. He compares the condition of the vessels in general paralysis and contracted granular kidney, and shows that in the former, in the vessels of the pia mater and cerebral hemispheres, there is a slow inflammatory process, the ultimate change being a fibrosis of the vessel walls, an organizing of the inflammatory products round the vessels which forms contracting fibrous tissue, thus bringing about a true cirrhosis such as is found in the kidney or liver. He propounds three views as to the relation of the two diseases; first, is the chronic renal disease responsible for the increase of arterial tension throughout the body with transudation through the capillaries and the lesions depending thereon? Such a view he thinks disproved by the fact that general paralysis sometimes exists without renal disease. The next view is that an arteriocapillary fibrosis is the commencement of both diseases, that they are both manifestations of a common condition. The third view is that both diseases have a common cause which may act directly on only one set of organs, *i.e.*, the arteries and capillaries, this cause being some poison, we know not what, which may induce chronic renal disease and general paralysis.

With regard to these various theories, it must be remembered that post-mortem examination reveals the results of chronic degeneration which has been going on till the death of the general paralytic. Whether the change began first in the kidney or the brain cannot be decided by the appearances after death. Albuminuria or other evidence of kidney disease is rare at the commencement of general paralysis, dropsy or uræmic symptoms are rare at the end, and if granular kidneys are found frequently after death, it is probable that the disease is a concomitant rather than a cause of general paralysis. There may be a toxic origin sometimes, but although the poisons of syphilis, alcohol, or gout may exist in many cases, they will not account for all, and if all general paralysis has a toxic origin, the toxins must be generated within the body, and with regard to these our knowledge at present is only in its infancy.

Diabetes.

Diabetes is found from time to time in insane patients. Dr. Savage says it is rare, in this supporting the view of Dr. Hale White. I believe we should find sugar in small quantity in many cases if we looked carefully for it, but it is overlooked because there are no symptoms to denote its presence, and the latter may be temporary

only. The vexed question arises as to the nature of diabetes, Is it a disorder of the nervous system or of the digestive? There is much to be said in favor of the former view, especially the fact that mental strain and worry are frequent causes of diabetes as they are of insanity, and Dr. Savage draws attention to the alternation between the two diseases and says that a patient may suffer from diabetes for a time and then may become insane, the symptoms of diabetes disappearing to reappear on the recovery from the insanity. I was lately called to see an old lady who had suffered from diabetes in a greater or less degree for some years. When I saw her, she was acutely melancholic. Her urine contained albumin but no sugar. In a very short time the melancholia passed away, but a large amount of sugar was noticeable together with albumin. In the course of a week gangrene of the right foot commenced. This was of the dry kind and it travelled up the leg, the foot becoming quite mummified. The melancholia did not return, but she died in about three weeks. I have an elderly man now under observation who had and recovered from an attack of melancholia some years ago. In 1895 he broke down again and with the melancholia developed sugar in the urine. This has varied from time to time as has the melancholia, though I cannot say that the variation has corresponded in a strictly inverse proportion. He has at no time kept to a severe antidiabetic diet and I do not think that it would be advisable to treat melancholic people according to strict rule, even if they have sugar in the urine. In the cases just mentioned, the insanity was not caused by the diabetes. There was considerable mental worry in both cases, and this, together with advanced age, was undoubtedly the cause of the mental symptoms. The man has a son who is almost as melancholic as himself, and his medical attendant tells me that he has found a trace of sugar in the water of the latter. It is said that uranium nitrate has a beneficial effect on these diabetic people.

Myxœdema.

Myxœdema and Insanity.—This affection was first described by Sir William Gull in 1873, and one of the patients whose case he mentioned came under my care for the mental disorder in 1880. The œdema had by that time passed away, leaving the skin baggy and pendulous from the distention it had undergone. There were no teeth and very little hair, the face was flabby and totally changed in expression, the skin was dry and rough, and the woman looked seventy instead of fifty-two years which was her age. In mind she was a curious mixture. Apparently demented, she yet retained a considerable amount of intellect of a feeble sort, and could even become

amorous. She could write a much better letter than could have been expected. She was throughout very feeble, and at last fainted while sitting on the stool, and died somewhat suddenly.

The disease occurs chiefly in women of middle or advancing age and sooner or later intellectual change is noticed in all, the change being an advancing slowness in apprehension, thought, or action. In some cases delusions or hallucinations may be discovered, but generally the insanity is of a negative rather than a positive character. The patients are greatly affected by cold and the temperature is usually below the normal.

Within the last few years the prognosis in cases of myxœdema has completely changed, and whereas formerly it seemed to be a hopeless and incurable disease, recovery is now of common occurrence. All this has come about from the discovery of the good results which follow the administration of the thyroid gland. This has been effected in various ways by transplantation, injection of extract, and lastly by feeding with extract or raw thyroids. Space does not allow of a detailed account; suffice it to say that the most satisfactory improvement and in many cases recovery has followed all these processes and especially the last. (See Vol. IV., p. 735, of this work.) Mr. Cecil Beadles has collected [24] a number of cases, and it is not too much to hope that the disease may be arrested at so early a stage that the mental symptoms may not bring the patients into the category of the insane.

Not only are adult myxœdematous patients improved or cured by thyroid feeding, but congenital myxœdema, commonly called sporadic cretinism, which is due to loss of function of the thyroid body, is vastly ameliorated by thyroid injection or feeding.

Exophthalmic Goitre.

The connection between exophthalmic goitre and insanity on the one hand, and myxœdema and insanity on the other, is of extreme interest. I had for some years under my care a lady who had suffered from the first-named disorder. The goitre, when I first knew her, had subsided, but the exophthalmos remained. She became pregnant, and after parturition insanity appeared with delusions of suspicion. She was in an asylum for a year and then returned home, but never entirely recovered, and later developed dipsomania with hallucinations of hearing, and eventually died of phthisis. In the *Journal of Mental Science* (XLII., 27) Dr. Maude gives the particulars of twenty cases and the mental changes observed. All were women about equally divided in age between early womanhood and the sexual decline, all private patients. None, or perhaps only one, could be

claimed as insane, but only two presented states of mind at all normal. The mental condition was very difficult to describe, but their peculiarities were highly defined. They presented an extreme restlessness with tricks of constant movement, were easily startled, sometimes had hallucinations of sight and hearing, and often suffered from vertigo. They became irritable, short-tempered, and discontented, prone to take offence, untruthful, and suspicious. The memory generally became much impaired and there was a marked confusion called by Sir J. Russell Reynolds, a "chorea of ideas." The patient finds it impossible to think of anything consecutively. If she makes an effort to write or talk about anything, other ideas crowd into her mind and displace the original one. Dr. Savage relates three cases[25] of patients at Bethlem, of whom two died and the third was discharged relieved, the exophthalmos and insanity both persisting. Dr. Carlyle Johnstone also reports[26] a case of exophthalmic goitre with mania, in which the patient died after being in the asylum nearly a year. Dr. Savage mentions certain cases of recurrent insanity in which with each period of mental disorder the whole of the symptoms of exophthalmic goitre appear, passing away again when the mental disorder subsides. The prognosis is bad in all the patients whose disease is confirmed, and it generally ends in death at an early period.

Cardiac Disease.

That any interference with the circulation in the brain and the nutrition of the cortex should be productive of insanity, is a reasonable conclusion. To study the etiology of this variety it will not be sufficient to examine the results of post-mortem examinations. Many changes in the heart seen after death are the consequence of the long-continued, violent, and irregular action of the organ produced by mental excitement during many years. In chronic cases we most commonly find the right side much thinner than the normal and dilated, while the left ventricle is thickened. It is in recent cases that we find cardiac disease causing insanity by interference with the brain nutrition. Young people have probably had attacks of rheumatic fever and their hearts are damaged by endocarditis, while the old may have various forms of valvular disease with or without atheroma. Dr. Mickle enumerates no less than nine forms of cardiac disease and associates with each certain mental symptoms; it is doubtful, however, whether such symptoms are to be found uniformly in each variety. Dr. Savage says: "With aortic or with both aortic and mitral disease, the symptoms may be either melancholic or maniacal; but I am inclined to think that with simple aortic disease and with hypertrophy of the left ventricle, it is at least not uncommon to

meet with acute mania and exaltation of ideas. In doubtful cases of men with exaltation of ideas, I expect to find post mortem hypertrophy of the left ventricle and atheroma of the aorta with more or less brain change." [27]

The nature of the symptoms depends, in my opinion, on the age and general condition of the patient. In the young we shall find maniacal excitement, incoherence, and perhaps exaltation. In the old, melancholia will certainly be the form most frequently met with. It is far more common to find in the insane feeble and sluggish heart action and a circulation which implies an insufficient nutrition of the brain. It does not follow that the insanity is due to the heart alone. The latter may fail for want of proper innervation or from general bodily weakness, and the pulse may be intermittent not from disease but from loss of power. A condition of brain due to anæmia rather than to cardiac disease is more frequent than insanity caused by the latter.

Disease of the Digestive Organs.

Whereas in old days the liver was supposed to have more to do with the causation of insanity than any other organ and the name of melancholia is derived from the black bile secreted therein, we now find it passed over almost entirely in our text-books, and no variety of insanity is coupled with it. Yet the lay mind is still haunted by the notion that the liver is responsible for depression of spirits and that it ought to be attacked by all the weapons which pharmacy affords. That the liver may be out of order in the general upset of the nervous system is possible, but that it is the cause of insanity by being thus disordered is doubtful, and although a purgative sometimes does great good and, by unloading the whole alimentary canal, may take away certain toxins and so relieve the depressed feeling that hangs over a man, yet a course of drastic medicine, such as used to be prescribed for the purpose of setting right the liver, is likely to be productive of more harm than good. Similarly there may be derangement of the stomach and loss of appetite, together with obstinate constipation. Here again the popular idea is that the mental symptoms are all due to indigestion and want of healthy action. Because there is constipation the patient takes less and less food for fear of overloading the alimentary organs. He gets thinner and thinner, looks yellow and cachectic, and the less food he takes the less will the bowels act, and the stronger are the aperient drugs which are deemed necessary. This hypochondriacal state may continue for a long time and end in extreme emaciation and neurasthenia or in insanity, the latter being produced not by derangement of the viscera but by starvation. If we are able to take such a patient

in hand and to compel him to eat and drink that which is ordered, regardless of his protests, it is astonishing how amendment of the mental symptoms follows the increased nourishment. Often in these reduced people an illness, such as bronchitis or influenza, is the immediate forerunner of the melancholia and is set down as the cause.

Uterine Disease.

On no subject do authorities differ more widely than on the connection between insanity and uterine disease, with which may be coupled all the disorders of the ovaries and ovulation. At a meeting of the Medico-Psychological Association in 1886 a discussion took place upon it wherein views were stated which ranged from Spitzka's, which was quoted, that even the grossest lesions of the female generative organs are not competent by themselves to affect the mind to such a degree as to produce insanity, to that of Newington, who maintained that the whole of the insanity, specially associated with the female sex was more or less connected with the sexual relations. In the *Journal of Mental Science* (Vol. XXX., 509) is an interesting paper by Wiglesworth containing the results of the post-mortem examination of 109 patients. Of these, he tells us, in 42 the uterus and its appendages were perfectly normal or at the most showed very trivial changes. Of the remainder 15 presented very slight alterations. In 3 the changes were secondary to parturition, and in one other were secondary and of recent origin. In 3 they were due to tuberculous constitutional taint as manifested in the lungs and other organs. But of the whole 109 almost all were chronic cases. In 7 only was the insanity of less than a year's duration, 8 were general paralytics, and many were of long standing, from four years up to twenty-seven. He also gives particulars of 65 insane women examined under ether during life, and here he found that 35 presented nothing worth calling abnormal. Of the remaining 40, 4 had congenital defects, 13 displacements of various kinds, 5 had ulceration of the os, 2 uterine fibromata, 1 was a case of subinvolution with sexual delusions which did not disappear when the uterus improved under treatment. One case presented hypertrophy of cervix with contraction of os, and in 1 there was some deflection of the uterus from old pelvic inflammation. In 6 there were lesions of the ovaries, in 4 of these there was some slight enlargement, and in the other 2 prolapse in Douglas' pouch. In 5 only were there sexual delusions, and in none of these was the insanity of less than two and a quarter years' duration. One patient had been insane eighteen years and 2 were general paralytics. From an examination of chronic cases little can be learned, as a uterine affection occurring at the commencement

of the insanity may have passed away, or one discovered late may have begun long after mental symptoms have been observed.

That there is a connection between the nervous system and the sexual organs is a matter about which there can be no doubt, and the furious erotic excitement which is found continually in cases of acute mania clearly proves it, and proves also that the sexual symptoms are the result of the brain excitement and not the cause; when the latter subsides, the symptoms vanish. To assume that in all the young women who are thus affected there must be something amiss with the sexual organs, and to subject them to local examination, either under or without an anæsthetic, would be not only useless but injurious. Yet that there are cases in which uterine troubles have been the origin of insanity is certain from the evidence of trustworthy observers, cases, too, in which recovery has followed the restoration of the disordered or displaced organ. Reflex irritation derived from any organ or part of the body may bring about mental trouble in a sensitive or predisposed brain. It is no wonder, therefore, that uterine or ovarian irritation may be the origin in some patients. The commissioners in their last report give 1.1 per cent. as the number among the assigned causes in the average of five years, 1890–94, and this in an average of 8,797 female patients admitted. It does not always follow that when there is uterine trouble it is the cause of the insanity or that removal will effect a cure. A lady under my care suffered from prolapse which was remedied by a pessary, yet the insanity remained; and another was wearing a pessary and had been doing so for some time; this was thought to have set up irritation, but the removal of it brought no relief to the mental symptoms. Thousands of women have uterine disorders of one kind or another, some serious, some trifling. For the latter they may or may not consult a specialist. Yet we seldom hear of insanity in the practice of gynecologists, and when it occurs, it will generally be found that there is in the background the same predisposing cause of the inherited taint of a neurotic ancestry.

Insanity of Pregnancy.

Insanity occurring prior to delivery is comparatively rare and few cases are of sufficient gravity to require restraint in an asylum. Bevan Lewis tells us that only 11 cases were admitted into the West Riding Asylum out of 1,814 females, and that of the 11 women only 2 were primiparæ; the larger proportion first showed symptoms of derangement after the third month of gestation, and no one had had a previous attack of insanity. The recoveries were in the proportion of 54.5 per cent., 2 more left sufficiently relieved for home treatment,

2 died, one from puerperal fever and the other from chronic phthisis, and 2 left recovered before their confinement. Dr. Savage in a paper read before the Medical Society spoke of insanity occurring (*a*) at the time of conception; (*b*) at the time of quickening; (*c*) in the later months of pregnancy. I doubt if these distinctions can be borne out by clinical observation. In my own experience I have found but few cases, and these in women who had had several children and had had them rapidly. It has occurred in the later pregnancies, not the earlier, has lasted up to the birth of the child and then passed away. Bevan Lewis does not give the ages of his patients; mine have not been young, but people oppressed with the cares of the family already around them, and dreading the advent of more. The question of the induction of premature labor will probably arise, but as to this authorities are tolerably well agreed that the cases are rare in which it is necessary, for these women generally do well after confinement. The symptoms are those of melancholia of a mild type, with ordinary delusions of fear and distrust, and, as might be expected, suicidal tendency. Here and there we meet with a case which rises into acute melancholia with all the intense fear and excitement which characterize the extra form of this malady. Of such patients the prognosis is most unfavorable, and it is impossible to treat them in a private house, but fortunately they are rare.

Puerperal Insanity.

This name is given to any mental disturbance which arises after childbirth. It may come on in a few days or weeks or after an interval of two months or six months, or any time within a twelvemonth. Later than this it ought not to bear the name of puerperal. The symptoms vary according as the outbreak is early or late, those of acute mania or acute delirium being most frequent, and characterizing the insanity which commences in the first or second week after labor, while those which begin later, after a month or longer, are more commonly melancholia; of the whole number the proportion of the cases of mania is about sixty-six per cent., those of melancholia being thirty-three.

That the processes of parturition and of uterine involution which follows constitute a time of trial to any woman who is by heredity predisposed to instability, must be obvious to all. Yet they are processes of nature through which thousands of women pass without harm even in highly civilized and specialized communities, while to natives of uncivilized and savage races such an event does not necessitate even a day's retirement. They are not "brought to bed" or

"confined" at all, but resume their daily life almost at once. It is clear, therefore, that something must be superadded to cause certain women to break out into mental disturbance after an easy, short, and safe delivery, and to do this again and again after the birth of many children. In the case of a primipara everything is new and exciting; there is a mental transformation, the wakening of the instinct of maternity, fear of the approaching confinement, and a new physical condition due to the gravid uterus and the nutrition of the child. Therefore it is not wonderful that we find insanity after first confinements, but out of sixty-eight puerperal cases Bevan Lewis tells us that only twenty-two were primiparæ, or a percentage of 32.3, so that the larger number had had children prior to the outbreak.

When we look for the cause of an attack of puerperal insanity, that which predisposes the patient is beyond question the inheritance of an unstable, nervous constitution; but there may be a variety of exciting causes. Women who have children late in life are specially liable to the disorder; ill health during the pregnancy, rapidly recurring labors, trouble with the milk or breasts, or albuminuria, may play a part in the causation. And mental anxiety may do no less. Straitened means and the certainty of increased expense necessitated by the confinement and the addition of another child, are potent disturbing elements, and to these may be added not infrequently a husband earning but little, perhaps idle or a drunkard, or children causing anxiety by ill health or bad bringing up, and in the case of a woman predisposed, the mental symptoms may be fostered by the absence of quiet necessary to such a one after delivery. Sleep here is of the utmost importance, but it is frequently overlooked by the nurse in charge of the patient, and from her we may gain very inaccurate information as to the duration of it. Some nurses who have a chattering tongue give a patient no rest. Day or night their talk goes on, and if they are not talking they are poking the fire or preparing food, or they wake the mother to nurse the baby, and so disturb her many times in the night. I am confident that many an attack has been brought about in this way. Friends, too, are not kept away, but are allowed to visit and perhaps bring disquieting news or excite by religious exhortations, and the like. All this acts as a cause, though it will not be given as the true one when inquiry is made. Something much more remote will probably be alleged and the true reason is ignored or concealed.

What is the *treatment?* Dr. Savage speaks of a *mania transitoria*, a delirious excitement which may come on during the second or third day after delivery, arising suddenly and passing off quickly, and this, he says, may be frequently subdued by a purge and a nar-

cotic at night. These cases, however, are rare in my experience. More commonly, a patient gradually drifts into an insane condition, the symptoms becoming more and more developed day by day, the first of all being sleeplessness. The sleep of all patients ought to attract the attention of the physician, but especially of these, and, if on close inquiry it is found deficient, prompt measures should be taken. The child should not be nursed by the mother at night, and sleep should be procured by narcotics which are of much greater use at this stage than later. Paraldehyde, sulphonal, or what is perhaps better, a combination of chloral and bromide of potassium will bring sleep with tolerable certainty, and enforced quiet and plenty of light will often avert the dreaded attack. The milk and lochia must be attended to, but they are frequently normal even in acute mania.

If our efforts to prevent fail, the symptoms gradually increase, there is less and less sleep, much talking, fitful changes of temper, likes and dislikes, and endless complaints rising into charges and delusions about people and food. The excitement increases also and the chattering is incessant; it is evident that an attack of mania has commenced. What is to be done? The first thing is to provide proper nurses skilled in the treatment of such cases. This will probably be resented by the monthly nurse, who may have been at the bottom of the mischief, but an unskilled person is worse than useless.

The question will then arise, shall the patient be treated at home or sent to an asylum? All will depend on the funds available, for three or four nurses may be necessary, constant medical visits, and a house in a quiet situation without the roar of street traffic or the cries of news venders, where, if it be hot weather, the windows can be open day and night. The illness now will follow the course of an attack of acute delirious mania, and the important point will be the administration of food. If this can be given in sufficient quantity and without a prolonged struggle, we may successfully carry out the treatment at home. If feeding by a tube is necessary, the resources of an institution are almost always required. Of drugs none is so useful as the combination of chloral and bromide of potassium given to procure sleep, not to allay excitement; I have found it possible by an occasional dose to prevent the patient dying exhausted for want of sleep. Opium in any form is strongly contraindicated.

If three or four weeks after labor mental symptoms appear, they are almost always those of melancholia. They commence also with sleeplessness and should be treated in the same way; if not successful we shall find the ordinary symptoms of melancholia, refusal of food, delusions of wickedness and the like, and a woman in this condition

is extremely dangerous to herself and child or children. Under the title of melancholia will be discussed the treatment of such people.

Prognosis.—The prognosis in cases of puerperal insanity is extremely favorable. In fact, in no form of mental disturbance is the percentage of recoveries so high. Mr. Bevan Lewis gives the recovery rate of seventy cases as eighty per cent. Dr. Clouston tells us that 87.5 per cent. of his cases had recovered by the ninth month from the commencement of the insanity. And we find that the mortality in the cases of either physician was about the same, viz., 8.4 per cent. All these are cases of patients admitted into the West Riding or Edinburgh Asylum. If we had the statistics of all the women who are treated and make good recoveries at home, the percentage would probably be increased, though it is to be feared that the percentage of deaths would rise also from the inadequate care which many receive at home, whose friends through prejudice refuse to send them to an asylum. Our prognosis, both as to recovery and death, must be largely influenced by the treatment proposed.

Dr. Savage draws a distinction between cases of ordinary puerperal maniacal delirium and septic cases which depend on puerperal septicæmia, but he says it is rare to meet with a case of insanity which depends solely on septic causes. With the latter statement I quite agree. There may be certain septic symptoms arising in the course of the malady which may be a complication or even a consequence; but in true septicæmia ushered in by rigors, high temperature, and the usual phenomena of puerperal fever, insanity is as rare as it is in typhoid, though wandering delirium and hallucinations are common enough.

Insanity of Lactation.

The exhaustion produced by prolonged lactation causes insanity in a certain number of cases. The time at which this makes its appearance will vary according to the condition of the woman and her susceptibility, for it is not always an illness dependent upon anæmia and exhaustion only. The inherited predisposition will often account for it, and the excitation produced by the mammary secretion and the operation of suckling is of considerable importance. It is a question whether a woman predisposed to insanity should ever suckle her infant.

The symptoms, as may be expected, are those of melancholic depression and in most cases come on gradually, commencing with suspicion, irritability, and accusations. Though they may have been noticed for some time and have existed without much alteration,

there may come a sudden and most dangerous outburst of violence, homicidal or suicidal. A woman may conceive a delusion that her husband is unfaithful and try to murder him, or she may kill her children under some other delusion, and may be most suicidal attempting to do herself harm in every way. So acute are the symptoms that they may rise to those of delirious mania, as in ordinary puerperal insanity, and the patient will go through the attack in the same way. These very acute attacks occur in the early months after labor and should rather be called puerperal than lactational. The true lactational insanity caused by the exhaustion of suckling is almost always melancholia.

Prognosis.—Mr. Bevan Lewis gives the history of 65 cases of which 44, or 65.6 per cent., recovered; 6, or 9 per cent., were relieved; 8, or 12 per cent., died; and 9, or 13.4 per cent., remained as chronic insane. And he remarks that the ratio of the unfavorable cases, the fatal and the chronic, steadily augments towards the age of forty, increasing from one-sixth of the whole at the age of twenty to one-third at the age of forty.

Treatment.—Nothing special need be said as to this. Whether the disorder be acute delirium, acute melancholia, or the ordinary form of the latter, the usual treatment is necessary. The breasts may be troublesome and may require friction or belladonna liniment. The catamenia will probably be absent, but will reappear when the health is restored.

Post-Febrile Insanity.

Insanity sometimes occurs in the course or at the decline of acute disorders, and a long list of writers have recorded cases of this kind. One of the earliest was Dr. Hermann Weber, who in the forty-eighth volume of the Medico-Chirurgical Transactions relates the particulars of seven cases of measles, scarlatina, erysipelas, pneumonia, and typhoid fever in which, towards the decline of the disorder, maniacal delirium came on with delusions of an anxious nature, and hallucinations of the senses, especially of hearing, but also of sight. The duration of the derangement was short, extending from less than eight to forty-eight hours. The outbreak was sudden; the time was in general the early morning, and almost always the commencement was stated to have occurred immediately after waking.

These appear to be the typical cases of the insanity which suddenly appears in the decline of an acute disease. We may imagine the sequence to be of this kind: First, the patient is a person of unstable nerve organization whose balance is easily upset and has been upset by the febrile condition and high temperature; the tempera-

ture and circulation decline and less blood is carried to the exhausted brain centres; sleep ensues and the brain nutrition is lowered to its minimum, and on waking suddenly from a short sleep, the instability is at its height and delusions and delirium appear; food and sedatives procure rest and recuperation and the mania vanishes. Authors speak of insanity occurring as the earliest symptom of typhoid, and of its appearing not in the decline but during the height of a febrile illness. Delirium, we know, will often be found in acute disease even of a mild character, but this is not post-febrile insanity. The cases I have seen in private practice have almost all recovered, and the prognosis is generally good, but here and there we find those whose hereditary predisposition exposes them to a mental disturbance which does not pass away, or does so only after a long time. Many suffer greatly from the exhaustion following influenza and do not recover. But it is to be remembered that influenza is a convenient "cause" and origin of a malady of which the friends do not care to tell us the truth, and that every cold which has been caught during preceding years is called influenza. When the insanity does not come on suddenly, but slowly and insidiously, the prognosis is of course much more unfavorable.

Traumatic Insanity.

Under this head we may include all the cases which depend upon a blow or fall, or a sudden shock to the cerebrospinal system, such as may be caused by a railway accident. They may be divided into two classes: in one we find mental symptoms following a blow, fall, or shock, caused not by actual damage to the brain but by the disturbance of the mental balance; such insanity either passes away like that produced by other causes which are not somatic, or remains as a chronic monomania with hallucinations or delusions. A second is characterized by organic brain changes, the result of damage done to the brain structure, which bring about permanent enfeeblement, or lead to general paralysis.

The first of these classes comprises many whose equilibrium is upset by a blow or a fall of no great importance by which no serious damage is done to the head or the brain, but a shock is caused to the system, even if the head is not the part affected. A slight blow on the head, from the fall on it of the lid of a desk, I have known followed by a mental upset; the patient being an elderly woman, the disturbance took the form of melancholia. A young man fell from a scaffold, a fall of only a few feet; he did not fall on his head and was not hurt, but shortly afterwards he developed symptoms of acute dementia which were severe for some time, but from which he per-

fectly recovered. It is probable that many persons break down and become insane who have had slight blows or falls, about which little is said because no serious injury was noted at the time. Whether such causes should be termed traumatic may be questioned. If we confine this term only to cases in which the injury to the head has been serious, we find that it is not a common cause. Dr. Hartmann[28] has collected 138 cases of insanity following injuries to the head, but he tells us that Krafft-Ebing among 462 cases found little more than 1 per cent., while Schlager among 500 patients found scarcely 10 per cent. The commissioners in lunacy in an average of admissions of 16,615 give a percentage of 2.9 as caused by "accident or injury." Dr. Hartmann says that there are generally concurrent causes, and that injuries to the head rarely cause insanity, save where there is a predisposition or the condition of the patient is unfavorable for quick recovery.

In 1888 Dr. Talcott read a paper before the annual meeting of the superintendents of American institutions in which he reported the recovery of two patients who had received severe blows on the head. One, a female, had received a fracture and had been trephined eighteen years previously. When she became maniacal the head was again trephined, and a depressed piece of bone removed. She was at first noisy, incoherent, and silly, then gloomy and anxious, but made a slow and steady progress towards recovery. Dr. Talcott also related two interesting cases in which a blow on the head had caused recovery in a person previously insane. One man had had seven attacks in nine years. In the seventh, while trying to swing on a gas bracket, he broke it and fell, striking his head. He was unconscious with symptoms of concussion. Three days after he was sensible and sane and three and a half years later he had had no return of insanity and was an active man of business. The other, a man suffering from delusional insanity, was struck on the head by a fellow-patient with an iron chamber. Next morning he was entirely free from delusions and soon went home well. Six years later he was in good mental health.

Far different is the fate of those who, having received an injury to the head, manifest after a long or short interval an alteration in character and habits. This may progress till it ends in delusions, in homicidal or suicidal impulses, or in loss of memory and dementia with signs of brain disease.

In these cases the brain has received some damage or bruising, either directly or by *contre coup*, and a gradual change and degeneration have set in and progressed till the mind has become obscured, while after death the morbid appearances correspond, thickening and

adherence of the meninges, old hemorrhages, and wasting of the brain and spinal cord.

Besides this termination, blows on the head may lead to true general paralysis of the insane. I have lately seen two patients whose disorder was ascribed to this cause. On one the top of a bedstead fell. The other while hunting had a most severe fall on his head. Dr. Mickle says that in some cases one cerebral hemisphere is much more affected than the other. This probably depends on the situation of the blow. In the two cases just mentioned, the disease ran its usual course, but the patients differed greatly, the one being quiet and becoming at an early period tractable and demented, the hunting man being furiously violent, requiring the restraint of an asylum.

Injury to the head may also be followed by epilepsy, and if the locality can be accurately defined, much good may follow an operation. So little risk is there nowadays in such a procedure that it may be proposed without much hesitation, and the operation itself may arrest the epilepsy, even if no irritating bone is found. Mr. Dent [29] has drawn attention to cases of insanity occurring after surgical operations, of which he has seen a few. He says the patients have usually been free from hereditary predisposition or neurotic taint. The mental symptoms have generally appeared from three to eight days after the operation, not immediately. Many of these cases do well when the mania is not very acute, but when the latter is the case and the operation has been a severe one, or when the constitution is damaged by alcohol or other disease, the patient may die even if the wound does well. In some cases he considers the insanity to have been set up by the anæsthetic, the symptoms following directly on the administration, and there appears to be no difference in this respect between one anæsthetic and another. It is probable that in all these patients the mental strain of anticipation is the chief cause of the insanity. Mr. Dent says it does not occur in the hysterical who vent their nervousness in this fashion, but in those whose feelings are controlled by a greater tension and by a reaction lose control after the operation is over.

Damage to the head at birth through difficult labor or the use of instruments is the cause of much mental defect, idiocy, or imbecility, and blows and falls in childhood may have similar results or may bring about convulsions or fits. Mental arrest rather than insanity is the outcome of such disaster.

Insanity of Childhood and Puberty.

Examining the insanity of children below the age of puberty we find such to be rare. Passing over idiocy and imbecility and all congenital defect, and likewise arrested development from fits in infancy, syphilis or injury, there remains to us a small number of girls and boys who show mental disturbance at an early age. These are all neurotic or "sensitive" children, the offspring of neurotic parents, often ultra-religious, who are constantly bringing before the child-mind the necessity of self-inspection, the advantage to self of being good, and the torments of hell that await the bad but can be avoided by the wise and prudent. The child with its inherited nerve weakness probably suffers in the first place from "night horrors," transient nightmares, and delirium, and at this stage much will depend on the judicious treatment of the nurse who may frighten it by stories of ghosts and robbers, of spectres, or policemen. With such tales and the parents' perpetual exhortations to piety, it is not surprising that we find from time to time children showing symptoms of melancholia; they are depressed, want to be alone, to sit in the dark, shunning the society of brothers and sisters, and unable to amuse or occupy themselves. Such a one must be removed from home, and this is as necessary here as in the case of an adult melancholic, and as childhood is pre-eminently imitative, the patient should be placed with healthy and lively children and not allowed to be alone at all. Special regard should be paid to the nutrition of the body. Very likely this has been neglected and instead of growth and bodily development proceeding normally from food, air, and exercise, there is an arrest and a substitution of nervous symptoms which should have no place in a child of this age. The necessity of an abundant supply of food, exercise, and sleep cannot be too strongly enjoined.

The child advances to the age of puberty, the age of great changes, and the unfolding of the procreative faculties with the function of menstruation. So important are these changes and so especial is the physiological epoch in the life of a boy or girl that it would appear probable on *a priori* grounds that we should find insanity to be common at this time. But it is not so. Though there are more cases now than there are in childhood, the number is small compared with those met with a few years later. In the report of the commissioners in lunacy for 1895 we read that during the five years 1889 to 1893 inclusive, the yearly average of patients admitted under the age of 15 was 301. Those admitted between the ages of 15 and 19 averaged 868, while those between 20 and 24 were 1,586. Notwithstanding

the great change at the time of puberty the individual is still a growing boy or girl, adding to stature and weight, developing muscular force and rejoicing in muscular activity and restless energy, enjoying the company of its fellows, competing with and rivalling them in feats of strength. Where all this is arrested and we find mental symptoms, egoism and self-consciousness, melancholic depression, maniacal excitement, epilepsy, or chorea, we may be certain that a bad constitution has been inherited. Insanity is not "acquired" at this age. As Dr. Clouston says: "The insanity of puberty is always a strongly hereditary insanity; it, in fact, never occurs except where there is a family tendency towards mental defect or towards some other of the neuroses." As might be expected, this insanity is more common in girls than in boys; the changes of the epoch are greater in them and the home life and home education lack many of the preventives which the school life of boys furnishes. The latter, however, has one danger which girls escape, viz., that of acquiring the habit of masturbation. This is much more frequently taught to boys than to girls. Some few of the latter may be self-taught, and women who are older may find out the pleasure derived from the excitation of the genitals, but in my experience not half the harm is done to them that there is to neurotic boys, who, taught the habit at school, indulge in it to excess and break down at an early age in what has been called the "insanity of masturbation." In comparing the age records as given in the report of the commissioners, it is to be remembered that all were cases bad enough to be admitted into asylums. But if we were to collect all the cases of the insanity of puberty which are treated out of asylums and pass as cases of hysteria and the like, we should greatly swell the number. More of these are treated at home than those of an older age. Being children, they are more easily managed in a private house.

Insanity of Adolescence.

I have said that according to the report of the commissioners there were admitted on an average of five years into the asylums of England and Wales 868 patients between the ages of 15 and 19, while those between 20 and 24 amounted to 1,586. Comparing these numbers with the whole population according to the census of 1891, we learn that the percentage of those of the ages of 15 to 19 was 2.9, while that of the ages 20 to 24 was 6.0, that is, the proportion had more than doubled. And it is reasonable that this should be so. The young man and young woman have ceased to be boy and girl; they are preparing to take their places in the world, to earn a posi-

tion or a name. They are attracted towards one another, and sexual feelings play their part, and love with its hopes, fears, and disappointments. Disappointment in many shapes awaits them. Some do not gain the position they covet in school or college. They fail in examinations after long study, and this especially to girls is very trying. Boys fail to enter the army, and this may mean the giving up a career on which they have set their hearts.

Over-study and contemplation of religion and religious subjects also play an important part in the production of insanity at this age, for they tend to foster the egoism and self-introspection which is a constant symptom of the disease, and whether they are led to think themselves better than other people and are turned into young Pharisees, or worse, when they imagine themselves to be sinful and desperately wicked, the end is the same, the egoism or egomania of the insane. Of the 1,586 patients enumerated in the commissioners' report, 1,356 were single, so that to a great extent we can eliminate such causes as those connected with child-bearing. Why, then, should six per cent. of the population become insane at the time of their full development and entrance into life? Here, as in the earlier period of life, hereditary predisposition plays its ever important part. Many of those who break down have had no disappointments, no love affairs, no religious excitement; yet between twenty and twenty-five without assignable cause, or after something of perhaps a trivial character, an attack of insanity is manifested. The hereditary history is carefully concealed and denied, for parents are loth to admit it, often on account of other children, and statistics are therefore valueless. The bringing up of such children has much to answer for; fathers who are not insane but crotchetty and exacting, may tyrannize over a nervous boy, compelling an overstrict obedience and enforcing it even with a horsewhip. Mothers may be ultra-religious, balls and theatres are prohibited as ungodly, Sunday is to be devoted to going to church and reading devotional works, and recreation of all kinds is cut down to the lowest point. Can we be surprised if the result is mental disturbance?

The symptoms of the insanity met with at this period are those of excited mania, noisy, often hilarious, not endangering life, and often marked in women by erotic ideas and language. This runs its course in a few months, often interrupted by relapses, but generally terminating in recovery. The prognosis therefore of this typical insanity is decidedly favorable. Recovery, however, takes place far more frequently and certainly in females than in males, and in my own experience I have found more young men remaining in the asylum as a chronic residuum than young women. The insanity here has not

been of the typical kind. It has been melancholic depression instead of excited mania or the hypochondriacal egoism of the masturbator. I believe almost all the young men who are left as chronic patients are the victims of this habit. They are not all melancholic. Some display conceit and swagger, and set defiance to their parents and all about them. There may be some acute symptoms and these will subside, and friends hope that recovery will follow. The patient gets well enough to leave the asylum and goes to some intermediate place for change, but his weak mind is too much damaged for perfect recovery, and he returns to drift into hopeless dementia.

I have not found masturbation such a prevailing habit in young women, but a symptom constantly met with in them is amenorrhœa, and this the friends will look upon as the cause of the mental attack, and will expect us to direct our attention chiefly to it, and to employ every kind of remedy they have ever heard of to remove it. Examination, however, of the history of such patients will tell us that the amenorrhœa is due to the general anæmic state of the individual, a state which may have existed for some time before any mental disturbance, which latter has been a sequel not of the amenorrhœa, but of the condition which has brought about the amenorrhœa. From the same cause the catamenia may never have appeared at all, but good feeding and suitable tonics will improve the health and cause the appearance or reappearance of the menstrual flow. When it does not come on, the mental symptoms will generally undergo an exaggeration at times corresponding to the monthly periods, and this will support the theory of the friends as to the connection between the two. It is to be noted that the terminations of the insanity and the amenorrhœa do not always coincide. The catamenia may appear and there is great rejoicing and relatives now think that surely the mind will recover, but this does not always happen. A young lady now under care had for three years amenorrhœa, she being in a melancholic state with refusal of food; at the end of that time the menses appeared and have continued regularly since, and she is now well nourished, but there has been no alteration in her mental state. She still requires to be fed, and will not occupy herself in any way. On the other hand, I have known the mind recover before the menstrual derangement terminated. Anything like local treatment or local examinations are greatly to be deprecated. It is not likely that anything will be found requiring local applications, and incalculable harm may be done and delusions of various kinds set up.

Insanity at the Climacteric Period.

As the advent of puberty brings about a great change in a girl, so the climacteric period and menopause may cause in some women a commotion in the nervous system from the withdrawal of the function which has so long played an important part in the life of the individual. All authors speak of a "climacteric insanity," and the popular belief assigns to all mental disturbance occurring at about that time the "change of life," as a cause. But like many others which are popularly looked upon as causes of insanity, this requires very close examination before we can assign it its proper position in our etiological table. As thousands of women pass through the pains and perils of childbirth without breaking down in their minds, so even more encounter the menopause without nervous disturbance. But when there are symptoms of insanity at about this age, it is so easy to assign the change of life as the cause, and so convenient to pass over inherited tendency, or the cares of a bad husband or troublesome family, the pinch of poverty, or alcoholic indulgence. And it is curious that the same popular belief which assigns the change of life as the cause of all mental disorder at the climacteric period, constantly leads people to hope and believe that this same change of life will be the cure of all the nervous and mental trouble which precedes it.

Bevan Lewis mentions the great disparity in the estimates of different writers as to the number of cases to be classed as climacteric insanity, the difference of course arising from the want of unanimity of opinion as to what really constitutes the criterion of a so-called case of climacteric insanity. Eliminating a large proportion of cases occurring at this period of life, such as recurring cases and all forms which had not originated at this epoch, also cases of epilepsy, imbecility, and organic brain disease, he finds a residue of 80 out of 1,808 cases, or a percentage of 4.4 upon the admissions.

That this is a period of emotional instability we can readily understand. It is also one of commencing decline, the going down the hill of life, and therefore we find, as we should expect, that the symptoms are those of melancholia rather than mania, with suicidal tendency and all the ordinary delusions of the depressed. Melancholia is the prevailing insanity of this epoch, whether in men or women. From such we should expect them to recover; if we find not melancholia, but excited mania, the prognosis is less favorable. Here, as in other forms, hereditary predisposition plays an important part and may be the chief factor, though the time of life may aid the de-

velopment. Yet this does not make the prognosis hopeless. Bevan Lewis gives us a recovery rate of 48 per cent., and of the recovered patients only 4 relapsed, and in 3 of these a predisposition to insanity was indicated by a former attack in earlier life with strong hereditary taint. Of the whole number of cases 27.7 per cent. had a family predisposition and 38 per cent. had suffered from a previous mental attack.

I have found this insanity curable but tedious. If sufficient companions and attendants are to be had, an asylum is not necessary in the subacute cases, and change of scene and surroundings often does great good, but the suicidal tendency here, as in all melancholia, is to be ever borne in mind.

Senile Insanity.

The insanity of the aged is generally associated in our minds with dementia, senile dementia, or senility, the last stage of mental decay and degeneration. But in looking through my notes of the cases of old people, above the age of sixty, I find that by far the largest number are recorded as those of melancholia, a number much exceeding those of dementia, while a smaller proportion may be described as mania. The last were for the most part patients whose symptoms denoted that which may be called "moral insanity," one old gentleman giving way to gross immorality, consorting with loose women and behaving in a way the opposite of all his former life, another squandering money in a reckless manner, going to the Derby by himself and ordering articles at shops far beyond his means, for which he had not the slightest use. I have found such mania subside under restraint and treatment, but it has been the precursor of the dementia which is so commonly seen and for which there is no cure. The storm of excitement which the unstable brain goes through in the maniacal condition proves too much for its strength; there is improvement, but weakening follows. The nearest approach to recovery which I have seen was in the case of an old lady of seventy-five who appeared to be in a hopeless state of dementia, and did not know that she was in her own house. Being unmanageable there, she was removed to an asylum, and for some weeks was in a state of mania with hallucinations and delusions of many kinds. She then somewhat rapidly improved and became perfectly clear in her mind and memory, and went back to her old home in less than three months "recovered." I have since heard, however, that the ordinary state of senile dementia has supervened, as was to be expected. Dr. Clouston gives an account of 203 cases of senile insanity, excluding

101 others which were cases of epilepsy, mania, or dementia of long standing. The age was from sixty to ninety years, and of these 203 persons 72 were discharged "recovered," "that is, in all of them their worst mental symptoms disappeared, they passing into normal senility. In many cases they became quite well in an absolute sense." And the latter, we read, were melancholic patients, and here we have another instance of the great tendency to recovery which we find in melancholia, especially in those of advanced age. The young do not recover in the same degree, it is not the insanity peculiar to them; but in elderly people the nervous depression and want of force do not appear to proceed from any organic brain change, and if the bodily health and strength are renewed, mental restoration follows. In the other forms of senile insanity, or as a sequence to them, dementia makes its appearance, the first symptom being usually loss of memory for recent events. This varies much from the inability to recall names, which is not uncommon in sane and younger people, to total forgetfulness of what happened a week, a day, or an hour ago. It may vary also on different days or at different times of the day. It may be slight, not rendering the patient incapable of taking care of himself, or severe, making it impossible for him to do so. Recent events make no impression on the fading structures of the brain. All the last acquisitions are gone, but those that were organized and stored away long ago remain vivid, and few dements there are who cannot talk about the bright days of their boyhood or the period of successful work. And this is explained by what we discover after death. Dr. Clouston tells us as the result of fifty-two post-mortem examinations that the most common lesion was a softening, localized and not very extensive, depending on a deprivation of blood from some obstructed vessel. The next was marked atrophy of the whole brain or considerable portions of its convolutional surface. Microscopic aneurysms and apoplexies were frequent, and explain the occurrence of transient attacks of hemiplegia, while degeneration of the cells and enlargement of the perivascular canals with dilated ventricles are part of the process.

MORBID ANATOMY.

There appears to be little to account for death when we examine the head of a patient who has died in an attack of acute insanity. A man becomes maniacal, his mania passes into violent delirium, and in the delirium and of the delirium he dies perhaps in a week. There may have been no bodily disease or complication and no assignable cause; the case may be called genuine "idiopathic" mania. But

when we open the head we find but little to account for death. We do not see such disease as we find in the lungs when death follows pneumonia, or in the abdomen after peritonitis. There seems hardly enough to have caused the death of a strong and healthy man so speedily. Yet what we do see points to the great storm that has raged there during the last week or fortnight of life—a storm that has brought about death by its violence, though at first sight its traces may seem to be few.

To take first the naked-eye appearances. There are signs of violent vascular disturbance in the meninges, the vehicles of the blood supply of the grey matter. "Sinuses and veins of pia mater full of blood—considerable effusion in subarachnoid space." This was in a woman who died of mania in fourteen days. "Pia mater much congested, arachnoid slightly opalescent." This also was in a woman, and such opacity of the arachnoid, though not uncommon, denotes in these cases excessive overaction. So violent may this have been that not infrequently we see effusions of blood from the rupture of small vessels between the membranes. There will also be found much serous effusion which accounts for the coma that in so many patients precedes death. When we remove the pia, and this in a recent case can generally be accomplished without difficulty, there are the same traces of violent action. The brain is discolored in places and not of uniform tint, and signs of congestion are numerous. Dr. Clouston gives a plate of the appearance on section of the anterior lobe of a patient who died of the exhaustion of acute mania. It shows the congested grey substance of the convolutions, congested white substance near the grey matter, and an inner ring of still more intense congestion along the line of junction of the grey and white matter, extending into the latter. There are also limited vasomotor areas of congestion in the white substance.

Such phenomena may be found in the brain of a patient dying in a first attack of acute insanity. But the vast majority of brains of insane persons which come under observation are not of those who die in the first attack but who have had repeated attacks, or die in a state of general paralysis or chronic insanity. They have been subjected to repeated congestions, the result of overaction, or to chronic hyperæmia leading to textural change. It matters little whether we call this condition one of inflammation or not. Pathologists may differ in opinion, but whether the cause be overstimulation or a depressing influence, there will have been a local hyperæmia leading to textural change, a change from higher to lower structure, an overgrowth of less complex and less highly organized material. We do not generally find increased vascularity except in cases of very acute mania or

general paralysis. As Bevan Lewis says (*op. cit.*, p. 448), "by far the larger number of cases afford evidence of poverty of blood in the brain and general malnutrition. Uniform pallor prevailed as a noteworthy feature in 841 cases out of a total of 1,565 autopsies, or considerably over one-half (53.7 per cent.)."

All the structures of the head may present alterations. The bones of the skull-cap may be thickened and yet light in weight from an increase of the diploë. This is not frequent; far oftener do we find them increased in thickness and density with rarefaction of the diploë, and adhesion of the dura mater, the periosteum of the calvaria. This is due to the constant hyperæmia which has occurred, "the result of repeated vascular engorgements and the excess of nutritive plasma brought to these parts by conditions of violent cerebral excitement occurring through a period of many years of chronic insanity. The thickened dense skull-cap is frequent in epileptic subjects and in chronic dementia" (Bevan Lewis). There may also be a thickening of the inner table with deep grooving and hyperostosis. This is disposed over the whole of the vertex, but chiefly in the frontal and occipital regions, especially the former.

On the contrary the condition may be one in which the bones are extremely dense and not thickened but thinned; sometimes they may be reduced both in thickness and density. These changes are usually found in connection with senile atrophy.

In a large number of cases the removal of the skull-cap is impeded by adhesions of the dura mater. Bevan Lewis speaks of twenty per cent. as the number, but Batty Tuke gives the proportion as much greater and says that he observed this condition in one hundred and nine autopsies out of three hundred, and this, notwithstanding that in Scotland general paralysis is less common than in England. Occasionally the adhesion extends over the whole vault, but more frequently it is found to be localized along the course of the coronal suture or beneath the frontal protuberances. It is also seen in the sagittal line and under the parietal eminences. The dura mater itself is seldom thickened, except where it is adherent to the bone, and is still more rarely adherent to the arachnoid and subjacent tissues. This, Bevan Lewis states, is another indication of his position that the inner smooth surface of the dura mater is not a parietal layer of the arachnoid, but an epithelial layer of the dura. It was thought that the so-called arachnoid cysts, so frequently found between the dura and arachnoid, were the product of inflammation and that the inner surface of the dura was a true serous surface, a reflection of the arachnoid, giving rise to these inflammatory exudates. The theory of inflammation, though still put forward by Ziegler and

others, is very doubtful, and it is more probable that such cysts and hemorrhages arise from loss of support, owing to atrophy of the convolutions, together with congestion of the meningeal vessels, leading to rupture. That we find adhesions of the clot to the inner side of the dura does not prove that there is a primary inflammation. The irritation of the clot may cause a partial organization and adhesion, but this is seen only in a few cases. According to Bevan Lewis, who in this follows Axel Key and Retzius, we find covering the brain (*a*) dura mater; (*b*) subdural space, formerly the "arachnoid sac"; (*c*) arachnoid; (*d*) subarachnoid cavity; (*e*) pia mater; (*f*) epicerebral space.

The extravasations I have mentioned are not uncommon and, as might be expected, are frequently found in general paralytics when there has in life been great mental excitement. They vary much in appearance; there may be a slight rusty staining over a patch of the inner surface of the dura, or it may be an extravasation flattening the convolutions and inducing considerable atrophy. Bevan Lewis quotes Rokitansky's description of one of these cysts. "Its adhesion with the dura mater is loose; it partly sticks on and partly is connected with the membrane by a few small vessels. Both walls of the sac are usually of a brown, rusty color, and tenacious. They may often be separated into several layers which vary in thickness, the inner of which are more thin; at the margin of the sac they coalesce and form one lamina, which soon becomes reduced to a thin, brown, rusty colored membrane, and spreading out further on the cranial vault reaches to the base, and at length terminates in a thin, rusty colored, gauze-like film. Within, the sac contains a more or less thick fluid of a dark and varying color, like chocolate, plum sauce, rust, or yeast. In course of time the lymph is gradually removed, the inner surface of the sac becomes smooth and polished, and the contents are changed into a colorless, thin, clear, serous fluid."

These formations are not, according to Bevan Lewis, the result of inflammatory action, for (1) the cyst is readily removable, being slightly or not at all adherent to the dura mater; (2) in the majority of cases there is no evidence of a pachymeningitis; the dura is not thickened, softened, or vascular and no organic connection exists between the two; (3) in the early stages the characters are purely those of a simple extravasation of blood into the arachnoid cavity (subdural space). With this opinion that subdural membrane formation is not the result of inflammation Middlemass and Robertson coincide.[30] They think, however, that these membranes are due primarily to "a hyaline degeneration of the vessels and their perivascular canals leading to an obliteration of both. While the vessels

are undergoing this morbid change, small hemorrhages frequently occur from them. Their obliteration is followed by the formation of new capillaries required to maintain the nutrition of the fibrous tissue. From these new vessels, the formation of which is necessarily accompanied by the development of a certain amount of granulation tissue, further minute hemorrhages occur. The extravasated blood becomes the basis of more granulation tissue. These changes are at first subendothelial, but the extending granulation tissue soon breaks its way through this barrier, and a membrane becomes developed, and by a continuation of the morbid process gradually increases in thickness." These degenerative changes, they suggest, are due to the morbid energizing of the brain, which is reflected upon the surrounding non-nervous tissues in a marked nutritional disturbance to which the capillary degeneration may be due.

A milky or clouded appearance of the arachnoid may often be seen not only in the insane but also in the sane. It occurs, however, much more frequently in the former, in fact it is the exception to find the arachnoid and pia (pia-arachnoid or arachno-pia, as it is named by some) retaining their delicate and transparent structure in those who have died insane. This opacity and thickening was also examined by Middlemass and Robertson, who do not look upon it as a result of chronic inflammation, but as depending also on an abnormal trophic condition. They attach great importance to the introduction of morbid products from the subjacent brain by the cerebral lymphatics into the arachnoid fluid, and think that the milky and thickened pia-arachnoid of the insane is due to an endothelial proliferation and degeneration and a connective-tissue overgrowth caused by the abnormal, and perhaps in some degree, irritative qualities of the arachnoid fluid.[31]

There are found often in the arachnoid of the cord, but occasionally also in that of the brain, certain bony growths of which the same writers give this account: "They result from a change which occurs in the condensed connective tissue which constitutes an arachnoid opacity. The fibrils swell up into a hyaline material, which, however, usually retains some trace of the striation of the original structure. The sponge-like form which is frequently found is probably the mere accident of the original arrangement of the denser strands of fibrous tissue. This sponge-like structure has a somewhat close resemblance to that which is produced by the process of intramembranous bone development, as is observable in the flat bones of a child's skull. Hence, probably, these structures may be regarded as of an osteoid character, as is maintained by Virchow."

All who have had to make post-mortem examinations of the in-

sane are familiar with the adhesions of the pia mater and brain substance which exist in upwards of thirty per cent., the majority being cases of general paralysis. "On attempting to strip off a portion of adherent membrane, there are seen by the naked eye numerous tough fibrous prolongations which look like enlarged blood-vessels, connecting the under surface of the pia with the cortex of the brain. When forcibly removed, the upper layers peel away to varying depths upon the pia, leaving an eroded surface, the base of which is punctated by large, open orifices from which coarse vessels have been withdrawn. Adhesions of some age exhibit a coarse, dense, fibrillar connection between pia and cortex; the normally delicate retiform aspect of the neuroglia is lost in the coarse fibrillation which has ensued. In earlier stages the appearance is suggestive of inflammatory implication, in the distinctly pinkish appearance of the cortex, sometimes diffused, sometimes limited to the areas of recent adhesions; the pia is thickened and tumid, the seat of nuclear proliferation, its vessels deeply engorged, and the superadjacent arachnoid also thickened, opaque, and œdematous. The distended vessels are coarse and tortuous, their sheaths thickened by multiplication of their cells, and the traversing of their structure by wandering leucocytes." [32]

Brain Substance.—In the acute forms of insanity there are often found after death patches of bright red mottling, defining the limits of certain vascular tracts or plexuses. This, according to Bevan Lewis, may depend on the smaller arterioles having failed to empty themselves into the venous system, the failure to contract being due to the paretic state of the vessel. The junctions of the white and grey matter, and also the fourth layer, are usually the sites of such discoloration. Although general inflammation of the brain substance is not met with among the insane, yet localized patches are not uncommon, due to an embolus or thrombus, to hemorrhagic foci, or new growths as tubercle or carcinoma. These may be surrounded by a zone of red inflammatory softening and beyond that a non-inflammatory zone of white or yellow softening. The cerebral tissue involved is swollen, œdematous, and variable in consistence up to an extreme degree of diffluence. It is usually of bright pink hue with streaky or punctated hemorrhages scattered through it; sometimes it will show no discoloration, but presents a quantity of inflammatory exudates, compound granule cells, nuclei, leucocytes, broken-down nerve structures, and pigment. Besides these localized inflammations we have the general chronic inflammation of brain and membranes, known as general paralysis (*q. v.*). Here the inflammatory activity is most marked in the frontal regions in both hemispheres, and less so in the parietal, while the occipital gyri almost invariably escape. The cortex is

much thinned in the frontoparietal region, and of very variable color, ranging from pinkish discolorations and congested patches to a pale or dirty gray. The arterioles of the cortex are coarse and engorged, and the substance is reduced in consistence, softened, and œdematous.

Softening.—Bevan Lewis mentions that out of 853 patients dying insane, 390 afforded instances of an increased consistence of brain, while 463 were noted as having a diminished consistence throughout. "The general diminution in cerebral consistence may be due to œdema of its texture, to disintegration of structure from the fatty degeneration of senility, or from extensive vascular disease restricting its nutrient supply, or it may be the result of inflammatory processes. In all cases the vascular system is largely involved. The œdema is first established by the undue engorgement of vessels which thus relieve themselves; the fatty disintegration of senile brain is invariably associated with, and greatly furthered by, diseased arterial tunics; and lastly, the inflammatory processes, which are of a chronic diffuse nature, are themselves vascular in their origin. Hence we see how large a section of the insane show indications of defective nutrition in the central nervous system, and derangements of its blood supply; yet acute or recent insanity affords few and far less pronounced signs of such impairment. It is in the chronic state of insanity that obvious structural changes indicate to us the serious nature of the nutritive failure. In instances of general reduction in the consistence of the brain, the organ fails on removal to maintain its erect position. It falls apart at the commissural junctions, the diverging hemispheres tending by the mere effect of gravity to tear the latter asunder, especially as these commissures are themselves unduly soft. The hemispheres have lost their plump contour, the convolutions may have undergone considerable atrophy, and their widely gaping sulci may enclose much serous fluid, while the whole brain feels flabby to the touch and devoid of its normal compact aspect, as well as of the firm and resilient feel of healthy structure." Considerable serous fluid distends the ventricles whose macerated walls are undergoing rapid solutions of continuity. The white substance appears glairy, is softened in texture, and pits on pressure; or it may have a dull, lack-lustre surface, mottled with diffused congested zones, stained with hæmatin, and presenting numerous coarse vessels. In extreme cases the brain substance may be completely diffluent here and there, the area of supply of the middle cerebral artery being far the most frequently affected.

Atrophy.—In many cases this must be looked upon as a sequel to the acute forms of insanity. In the chronic stage it is seen to invade

the grey and white medullated structures to an extensive degree. "It may be general," says Bevan Lewis, "throughout the cerebral hemispheres, while the basal ganglia and mesencephalon escape implication; but occasionally the whole of the intracranial ganglia are involved. On the other hand, it may be localized or partial, when it may implicate any region of the brain. It may be rapidly induced as the result of an inflammatory process, or may be of extremely slow and insidious progress, or the steady progressive dissolution implicating the whole cerebrum, which distinguishes the atrophy of premature senility. The intimate structure of the central nervous system would indicate peculiar relationships as established between the individual elements, which must be fully recognized ere we clearly see the significance of these forms of atrophic change. The more highly differentiated the structural parts of a tissue become the more dependent also do they mutually become. The nerve cell is dependent upon the terminal artery for a due supply of its nutrient plasma; the artery, in turn, is regulated as to its calibre by the functional activity of the nerve cell; the lymph connective system of the neuroglia is stimulated to renewed activity by the accumulating products of nerve disintegration; the nervous elements depend upon this continuous removal of effete material for their normal storage and discharge of energy, and so in like manner the connective and vascular elements are mutually dependent. In no organ of the body is this mutual dependence of parts so exquisitely elaborated as in the brain and, *a fortiori*, the cerebral cortex."

It often becomes a question, says the same author, whether changes observed in the nerve cells are evidence of primary implications, or whether they are secondarily induced through a disturbance in the circulation of the district, or impairment of the lymphatic functions of the cortex, or other cause. "There is every reason to believe that in the nervous centres both parenchymatous and interstitial change may occur as the primary fact; that the nerve cell may be stamped with a morbid instability wholly independent of any *ab extra* agency, and this as an inherited or acquired condition; nor is it unreasonable to suppose that the changes in the nerve cell in *physiological* senescence are initiated apart from any nutritive anomalies and vascular changes, being simply the expression of the expiration of its fixed term of existence. The very general atrophy of the cerebral cortex occurring in pathological senescence is often, but by no means invariably, associated with a degeneration of its nutrient vessels, and when these vessels are involved, it is to a very varying degree. Yet what is invariably found is the degeneration of the nerve cells which in any appreciable degree of atrophy are extensively

implicated. We have here, in fact, what may be regarded as a true parenchymatous degeneration, the primary change being initiated in the nerve cell. Other forms of atrophy, usually more limited in distribution, occur as the result of *overaction* of nervous centres; in such cases the element which chiefly assumes the morbid rôle is the connective matrix, or neuroglia, although the primary incident was undoubtedly nervous. Illustrations are afforded in the case of alcoholism in which repeated overstimulation of nervous elements, and the waste and effete material so produced, demand from the lymph connective system more than its capabilities can accomplish; the result is a temporary hypertrophy of this tissue, the multiplication of its active elements (phagocytes) followed by their fibrillation and the eventual atrophy due to the encroachments of the connective upon the nervous elements. In cases of epileptic insanity again, overaction leads to degeneration and atrophy of nerve cells through the medium of an encroaching connective. The conditions of the epileptic, however, are by no means parallel to the alcoholic, and we find that in lieu of actual atrophy of the brain mass there is often hypertrophy and augmented density due to the inordinate growth of the connective element."

Nerve Cells.—The chief morbid appearances which the nerve cells present are those of granular and pigmentary degeneration. In the former the whole cell, according to Bevan Lewis, becomes swollen, the cell protoplasm is clouded and obscured by the formation of granules within, the nucleus often retires before the degenerating mass and becomes atrophied and shrunken. The lateral processes become attenuated, dwindle and disappear, the apical process disintegrates, the basal extension remaining but often swollen and prominent. Many of the smaller cells become mere heaps of granules, the whole of the field around being the seat of much fatty granular matter, especially round the blood-vessels. The early stage of granular disintegration of the cortical nerve cells is signalized by certain remarkable features in the peripheral zone of the cortex immediately beneath the pia mater. The medullated fibres running parallel to the surface assume an extreme degree of varicosity, the spider cells of the lymph connective system proliferate, and we see here in this layer of the cortex the so-called colloid degeneration which we find existing in the medulla and elsewhere. This appearance is found in senile dementia, and Major was the first to point out that a primary senile atrophy of the brain cells occurs in this disease. Pigmentary degeneration, that is, excessive pigmentation, is especially found in the insanity of epilepsy and general paralysis. It is an evidence of a bygone functional hyperactivity, and is well seen in the large ganglionic cells

of the cortex. The changes which occur are thus enumerated by Bevan Lewis. First, there is a period of overactivity, during which the cell appears swollen with increase of pigment. There is a dark staining of the protoplasm, nucleus, and branches, and the pigmented area appears to be separated from the remaining protoplasm of the cell by a well-defined wall or cincture. Then there is a period of diminished activity when the nucleus is deformed and fatty, and the processes are few and faintly stained, while in the last or period of absorption there is fatty transformation and decoloration of the cell, then atrophy with shrinking or ruptureinto a heap of granules (*op. cit.*, p. 476).

Bevan Lewis also describes another morbid appearance of the nerve cells due to arrest of development, and found in the subjects of epileptic idiocy. At an early phase of its life the cortical nerve cell is of spheroidal contour, its basal process is non-medullated, and the cell itself is possessed of extremely few processes. They are utterly unlike the form ultimately assumed in the fully developed stage, and when found at a late period of life they point to an arrest of development. The contents are sometimes granular throughout, not in one part only, and usually pigmented. The nucleus is eccentric, and the paucity of branches is very notable. This appearance of the cells is chiefly found in the second and third layers. Such competent observers as Major[33] and Hutchison[34] have discovered morbid appearances in the brain cells of the sane, the changes being chiefly in the large pyramidal cells of the deeper layers of the grey matter, and consisting mainly of pigmentary degeneration in various degrees from a mere increase of the normal amount to a complete destruction of the cell and its replacement by a heap of pigment granules.

Nerve Fibres.—In 1868 Batty Tuke and Rutherford described a morbid change as affecting the neuroglia or connective tissue called by them *miliary sclerosis.* This has been shown by Bevan Lewis to be a lesion not of the neuroglia but of the white matter of the brain, pons, medulla, and lateral columns of the cord. There may be seen in a section prepared in chromic acid a number of opaque spots irregularly distributed. When magnified by a low power they have a somewhat luminous pearly lustre and when magnified 250 and 800 diameters linear they are seen to consist of molecular material with a stroma of exceedingly delicate colorless fibrils.[35] The patches may be unilocular or multilocular, the former varying from $\frac{1}{250}$ to $\frac{1}{800}$ of an inch, the latter from $\frac{1}{50}$ to $\frac{1}{100}$. Of these Bevan Lewis says that they may be due to an implication of a neighboring blood-vessel, by the exudation from the vessel inducing such swelling of the myelin as to rupture the delicate investing albuminous sheath, or possibly by a

direct action upon the latter. The patch undoubtedly consists of altered myelin exuded in droplets from the medullated tubes and coalescing more or less completely; in a large proportion disruption of the axis cylinder occurs.

Batty Tuke also described another lesion called by him *colloid degeneration.* "The colloid bodies appear as round or oval in form, having a distinct wall containing a clear, homogeneous, transparent, colorless plasm, and occasionally showing a small nucleus but no nucleolus. They appear first in the white matter next to the cortical substance, but as the disease advances they become diffused outwards and inwards. In extreme cases the appearance of sections containing them may best be compared to a slice of sago pudding, for they exist in such large numbers as almost completely to fill the field of the microscope, separated slightly from each other by a fine granular material." [36]

This "colloid" degeneration Bevan Lewis believes to be also, like the "miliary," a stage in the progress of a chronic degenerative affection of the medullated fibres of the central nervous system, an affection of most frequent occurrence in the brain of the insane. Whether it be taken to indicate a simple degenerative change, or one of chronic inflammatory irritation, the real origin of the affection is the severance of the fibre from its trophic cell. It is in the diseased state of the cortical nerve cells that we must seek in most cases for an explanation of this degeneration of the nerve fibres.

Neuroglia.—The connective tissue or neuroglia shares in the morbid process which takes place in various forms of insanity, particularly in general paralysis and chronic alcoholism. As degeneration of the higher elements of the brain proceeds, the cells of the lymph connective system (which Bevan Lewis calls scavenger cells) become highly developed. "The processes of the latter apply themselves to the nerve cells, and surround and embrace them closely. They multiply and throw out their protoplasmic extensions in all directions, tie down blood-vessels, draw the perivascular sheaths by their contraction out of their normal course, and the vessels themselves become contorted and drawn from their normal direction. These scavenger cells, however, have but a brief existence. They throw out innumerable fine processes, and as the fibrillar meshwork increases so the cell protoplasm, at whose expense they appear to be formed, dwindles down and eventually disappears. Hence we have a veritable substitution of fibrillar connective formed out of the effete material afforded by the atrophic nerve tissue—a genuine degradation of tissue."

Lesions of Blood-Vessels.—Batty Tuke in his lectures enumerates five morbid conditions of the vessels in the order of their inci-

dence: 1. Simple dilatation; 2. Exudate deposits; 3. Opacity and thickening of the hyaline membrane; 4. Dilatation of the retaining canal; 5. Hypertrophy of the muscular coats.

Dilatation may be observed in many patients, even when there is no thickening of the walls. It may be found in both recent and chronic cases, and is a necessary sequence of prolonged hyperæmic action. Major remarks that it is a condition most commonly present in general paralysis, and that it also characterizes the vessels seen in chronic brain wasting. Bevan Lewis says that in general paralysis the long, straight vessels of the cortex become enormously and unequally distended, showing numerous ampullæ or aneurysmal distentions, usually fusiform in character, their tunics corroded with nuclear proliferation. Similarly dilated vessels may also be seen in the white matter.

Morbid deposits are seen adhering to the walls of the vessels. These are hæmatoidin, which is found in the form of large amorphous masses of a dirty yellow material. This substance Tuke says he has generally found in small quantities on the vessels of most sane subjects, but in a manifestly less degree than in the insane; that in the non-insane subject it appears to depend to some extent on age, and more especially on the nature of the disease which has caused death. In fever cases, in which the insanity of delirium and coma had supervened, it is pretty well marked. Hæmatoidin may also be found in the form of crystals, especially at the bifurcations of vessels. Another morbid deposit, noticed by both Batty Tuke and Major, is a very fine molecular material found in the smallest capillaries, homogeneous in structure, sometimes of a slightly pale color, more frequently colorless, in many ways suggesting a fatty nature, though the presence of fat is not shown by chemical tests. Of this Major says that it is highly refractive and unaffected by carmine. Syphilomatous deposits are found around the walls of the cerebral arterioles, which, being converted into fibrous tissue, cause the transverse sections to appear greatly hypertrophied, and this may go on to almost complete occlusion of the vessels. Clouston gives the section of the brain of a man who had labored under syphilitic insanity, with slow arteritis affecting the anterior and part of the middle lobes of one hemisphere. Absorption of nearly all the white matter of the centre of these lobes had taken place, the grey matter of the convolutions being left intact and forming a wall round the fluid mass. The greater vascularity and vitality of the grey matter as compared with the white are thus illustrated, also the different sources of the blood supply of each.[37]

The hyaline membrane which is described as a prolongation in-

wards of the pia mater, forming the wall of the lymphatic spaces which exist around the vessels, becomes opaque and fibroid, instead of being transparent and hyaline. It may serve for the deposit of fatty granules and hæmatoidin, or may itself be puckered and thickened, and in this state may be traced with unusual distinctness.

The canals in which the vessels are contained, the so-called perivascular canals, are sometimes found dilated. "In chronic cases," says Batty Tuke, "more especially in epileptics and general paralytics, the transversely cut vessel is seen surrounded by a clear ring of unoccupied space, with radiating trabeculæ of connective tissue extending between the hyaline membrane and the cerebral substance. In extreme cases the cylinder has been found from four to six times the calibre of the contained vessel." These clear spaces are caused by the dilatation of the congested vessel which produces an expansion of the surrounding parts.

A thickening of the coats of the arteries was described by the late Dr. Sankey many years ago.[38] It may be due to hypertrophy of the muscular coat, the result of efforts to overcome obstructions in the ultimate capillaries. Bevan Lewis speaks of the invariable presence of a fair-sized blood-vessel—lying in direct contact with patches of the miliary sclerosis already described. He believes that the coats of the vessel are involved by extension in the morbid process, and thus unduly thickened, the perivascular nuclei have undergone great proliferation, the vessels are much contorted and very frequently occluded. Major also speaks of great proliferation of nuclei in the brain of one who died of chronic atrophy.

The "Insane Ear."

There is a morbid appearance frequently met with in asylums, not after death but during life, which has been called the "insane ear" or hæmatoma auris, or othæmatoma. Writers differ widely as to the pathology, the most diverse opinions being held as to the exact etiology, the presence or absence of preliminary tissue changes and the seat of the hemorrhage. The appearance is that of an effusion of blood or bloody serum between the cartilage of the ear and its perichondrium. It may develop gradually, commencing with marked swelling of the ear, and may be of the size of half a walnut to that of a hen's egg, occupying the helix, its most frequent starting-point, or involving the concha and the whole of the anterior surface of the ear, hiding its configuration, blocking the meatus, and projecting as a livid, plum-colored mass. On the other hand it may come on rapidly, almost suddenly, in a night, but in my experience this sudden onset

was due to a blow. I have seldom known it to burst, but there may be an oozing of serosanguineous fluid. After attaining its full development it begins gradually to shrink, and this shrinking will vary much according to the size of the swelling and the evacuation of the contents. There is almost invariably, if the tumor has been allowed to attain any size, a puckering or shrivelling of the ear which indicates what has happened. It occurs more frequently in the left than in the right ear, is found usually in general paralytics and those suffering from chronic mania and dementia, and is about four times as frequent in men as in women.

It is not, however, confined to the insane; it is seen in pugilists, wrestlers, football players (Farquharson found it in boys at Rugby), in any who are likely to receive injury in this region. For this reason some writers assert that it is due always to injury. In my experience I have met with "insane ears" which were undoubtedly the result of violence; in one case the patient fell out of bed, striking the ear; in another it followed the holding of the head necessitated by forcible feeding.

The pathology of the affection has recently been carefully investigated by W. Ford Robertson, who has published the result in the fourth volume of the Edinburgh Hospital reports. The changes which he noted are those of the cartilage cells, vacuolar degeneration with more or less marked shrinking of the nucleus, the whole cell ultimately breaking down and disappearing. Along with this there is a disintegration of the yellow elastic fibres which also disappear, and the result is that when the degenerated area is large the central portion liquefies, so that a cyst is formed, which comes ultimately to be filled with clear fluid. Some portion of it is usually in immediate connection with the perichondrium, from which, or occasionally perhaps from contiguous perforating arteries, vessels pass in, extending in time more or less completely round the wall. This is the most frequent condition. Sometimes the area may be replaced by vascular fibrous tissue if the diseased portion is small and connected directly with the perichondrium. "The hemorrhage takes place usually from the new vessels in the walls of a cyst formed by this degeneration, less commonly from the vessels of new tissue which replaces a portion of the cartilage independently of the formation of a cyst, and, though probably only very rarely, from those of the perichondrium which have been ruptured in consequence of fracture of the cartilage at a degenerated spot. Such new vessels are more liable to impairment of nutrition than the original vessels of the tissue, and when they rupture independently of traumatism it is owing to degenerated change."

Certain observers finding in these hæmatomata micro-organisms, have attributed to them the origin of the affection and have advocated an antiseptic treatment. In the same volume of reports there is a paper by D. A. Welsh, who dissents from this view and looks upon these organisms as accidental. These are his reasons: 1. The cases examined show that no single organism can be regarded as the cause since at least three different varieties have been found; 2. Organisms are by no means constantly present, there being a considerable proportion of cases, which, examined with all due care, give purely negative results; 3. Inoculation has failed to reproduce the condition, causing simply inflammation and suppuration; 4. The organisms discovered are all identical with well-known pyogenic forms which have never been found to produce any condition analogous to hæmatoma auris. It is not the presence of organisms that determines the formation of the hæmatoma, but it is hæmatoma that affords a subsequent nidus for the organism.

There seems to be no question that the best method of treatment is that recommended by the late Dr. Hearder, namely, painting at as early a period as possible the inner surface of the pinna with a blistering fluid. The contents are solidified, and the chance of deformity is minimized.

SYMPTOMS OF INSANITY.

The False Beliefs of the Insane.

When we examine the symptoms of insanity, we find that they may be resolved, speaking generally, into two classes, false beliefs and insane acts and conduct. If we study these false beliefs we meet with certain words which vary somewhat in meaning according as they are used by different authors, and therefore require a brief consideration. They are *delusion*, *illusion*, and *hallucination*.

A *delusion* I have elsewhere[39] defined as a false belief in some fact which personally concerns the patient, of the falsity of which he cannot be persuaded either by his own knowledge and experience, by the evidence of his senses, or by the demonstrations of others.

The word *illusion* is used in more ways than one. The common meaning is a false interpretation of a sensation actually perceived. A person sees a cloud in the sky and says it is a chariot, or hears a noise in the next house or the street, and imagines it to be a voice addressing him. Others, however, look upon an illusion as something identical with an hallucination, while some, as Prichard, use the word as the equivalent of delusion and substitute it for the latter.

Hallucinations are false perceptions of the senses, the eye, the ear,

the nose, and so on. The patient does not mistake something which he sees or hears for another thing. He hears sounds or voices when there is nothing to be heard, and sees objects in utter darkness. The sensation is entirely subjective and within his own head and not excited by anything external. But this he cannot be made to realize.

It will be sufficient if we examine the rise and nature of delusions and hallucinations, passing over illusions as a term the exact meaning of which has not yet been decided.

Delusions, it must be borne in mind, always concern the patient personally. Mistaken beliefs, beliefs in mesmerism, spiritualism, or ghosts, in such matters as spontaneous combustion or the thousand and one popular fallacies about health, these are not insane delusions, unless the person who holds them believes that they concern him, that he is being mesmerized or burnt, and must therefore act in some insane way, or otherwise carry out his belief in his conduct.

Here the self-consciousness, the rise of which is, as has been stated, such a distinguishing feature of all insanity, is prominently shown. The patient's self or the environment which relates to himself is the sole object of his thoughts.

Two things concerning delusions are tolerably certain. The first is that they arise from an alteration in the function of the mental centres of the brain and derive their character from it; secondly, that they are not the first symptoms of nerve disorder but must have been preceded by others, though we may not have had the opportunity of observing them. Inquiries may reveal that there has been noticed an alteration in the individual; the nights have been sleepless, he has complained of his head, the appetite has been impaired, the digestive apparatus has been disordered. He has been told probably that his liver is out of order and has been severely purged with little benefit. He is out of sorts, out of spirits, cannot attend to his work, or take any pleasure in his usual pursuits.

In many cases the patient feels and thinks that something is amiss with him, as indeed there is. His consciousness, however, of there being something wrong with his head and nervous system will vary much. He may be aware of it and seek our advice and assistance like any other patient, and yet may not believe what we tell him. He is more likely to be unconscious of his real condition and to attribute the feeling he experiences to external causes. According to the feeling and its degree and intensity, will be the nature of the cause to which he ascribes it and the means taken to get rid of it.

The defective condition of the nerve force and the reduction of the highest mental centres operate in a twofold manner. First, the lack of nervous energy brings about the feeling that something is very

much amiss; and, secondly, the health and healthy action of the highest centres are so reduced by the loss of nerve power that the patient is unable to see the absurdity or impossibility of the delusions which he creates to account for his ill feeling.

The feeling that something is wrong with his health is very apt to engender the idea in the patient that he has taken something in his food or his drink which has done him harm. This is in my opinion the commonest of all delusions and one which arises in a large number of the depressed cases. I have known it to be the only one in many patients whose malady has been of a transitory nature, and in whom it existed perhaps only for a day. It will vary very much from the notion that the cooking is bad or the utensil not clean, to that of arsenic or such poisons being given, and the individual either fears to take any or declares that he is suffering from the effects of that which he has eaten or drunk on a previous occasion. From the idea that his food is poisoned he proceeds to accuse some one of having done it, and thinks that the culprit is some servant or other in the house, or even his wife, or that it is some person known or unknown outside who is compassing his destruction or endeavoring to cause him sickness or pain. Such a delusion leads some to refuse food altogether, some will only eat eggs or such things as they think cannot be tampered with; others will eat nothing but what they have cooked themselves, or they will get some friend to taste first that which is set before them. It is often an awkward difficulty to face at the commencement of a mental illness, for food is refused on this account just at the time when it is very necessary that the patient should be well nourished, and at the same time it may be prejudicial to have to threaten or adopt forcible feeding, as it may intensify the fear that poisons will be administered; yet the forcible administration cannot be long delayed. The same feeling of there being something amiss may give rise to another set of ideas, the delusion that the sufferer has some loathsome disease; a man may imagine that he has syphilis or leprosy, a woman that she has cancer. Every description of hypochondriacal complaint may have such an origin, which may range from possible disorders to such delusions as that the head is made of brass, or the body full of electricity, or the inside burnt up by fire. And inasmuch as the majority of such people suffer from constipation, we are constantly told that their œsophagus or bowels are blocked so that nothing passes or can pass, and this is a frequent reason for refusing food.

Another very common delusion, arising from the same feeling of being ill or altered, is that every one is looking at the individual. This, like the last, will vary in degree; at one time he will merely think that passers-by look at him, then that they avoid him, then

that they deride and point at him and the cabmen and omnibus-men jeer at and mock him. For this reason he stays indoors and will not go out, and if he is not taken in hand and treated, this fear may last for years and make him an insane recluse or "hermit." In the same way all the newspapers write about him and all the mysterious advertisements and paragraphs refer to him. If he cannot fix the annoyance on any one he knows, he thinks the police or unknown conspirators are plotting against him, and that they can by occult or supernatural methods damage or worry him even from a long distance.

Another result of the feeling that something is amiss is the delusion common in men that their monetary affairs have gone wrong or are going wrong, and that ruin is before them and starvation awaits their family. This not being a question of health or of poison which cannot be demonstrated, but one of facts and figures, ought, one would imagine, to be easily disproved by a man of business or lawyer. But we do not find this to be so. Proof absolute and irrefragable, deeds, bankers' books, and ledgers do not shake the delusion one iota. Argument on the subject rather strengthens than dispels it, and we have in this a good confirmation of the definition I have given, for this delusion is one of the falsity of which a man cannot be persuaded by his own knowledge and experience, by the evidence of his senses, that is, by what he sees in black and white, or by the demonstrations of others, his advisers and friends. These patients when driven into a corner will point to some investment, perhaps of a trifling sum, the value of which has gone down somewhat in the share list, and on this account they will say they are ruined. One gentleman, miserly at all times, used to invest his income till he left himself scarcely enough for his current expenses. Then he became melancholic and declared he was ruined because he had only a small balance at his bank. His income was about $15,000.

Many, especially women, are low-spirited and troubled, not on account of their worldly wealth or bodily health, but by fears that they have been wicked, so wicked as to destroy their hope of salvation in the life to come. They set aside the consolations and promises of religion, accuse themselves of all manner of imaginary sins, attribute the death of relatives to their want of care and affection, or declare that they have committed the sin against the Holy Ghost. If actual demonstration fails to convince those who think they are beggars that their fears are delusions, we need not be surprised that the assurances of friends or spiritual advisers fail to convince these that they are not so desperately wicked. It is a popular belief that such religious delusions are very incurable. In point of fact they are not more incurable than other gloomy fancies, but melancholia being for

the most part a tedious disorder they may persist for a long time, and so give rise to the notion that patients are not likely to recover from them. They often occur, too, in persons of advanced life, at the climacteric or even later, and the progress of the disorder in these elderly people is likely to be slower than in the younger. But while writing this there comes to me the news of the perfect recovery of a young man of thirty-three years, after an attack of profound melancholia of three and a half years and the most gloomy forebodings of medical advisers and friends.

To go through the various ideas and fancies which arise from the altered and depressed condition of these patients would be an endless task. They may, speaking generally, be described as fears of some impending evil, this evil being one to which they are justly doomed on account of their sins, or which is to be unjustly inflicted upon them by the machinations of their enemies. Either form of the delusion may be a source of equal torment to the sufferer and equally difficult to deal with. There is, probably, no greater suffering for any one in this life than the torments which these melancholic people endure week after week and month after month. No bodily pain, not the agony of neuralgia or the gnawing of cancer, is to be compared with it. Our only consolation is that in the majority of cases it will pass away, though our assurance of this brings little or no relief to the present suffering. The prognosis is good in all except when the health is utterly broken down or some bodily disease stands in the way of recovery. And even here I have known the melancholic gloom lighten or pass away as the disease got worse and death approached.

This is not the place to discuss the treatment of melancholia, but the favorable prognosis above mentioned must be supplemented by one addition. All such patients are to be looked upon as suicidal and are to be guarded accordingly. In the newspapers, unfortunately almost daily, are to be read accounts of suicides of persons who, it may be learned even from the brief and meagre reports, were in this state of mental gloom, and might have been saved and cured had the friends possessed the courage to protect them during their illness. Thinking that they are doomed to some terrible ill and that life is insupportable, incapable of receiving any assurance or comfort, they try to shuffle off this mortal coil, and will certainly do so unless closely watched. And not only may they try to commit suicide, they may try to escape from wherever they are, even their own house, either in order to carry out a suicidal purpose or to get away from enemies and the punishments and tortures which they believe await them. The refusal of food which is so common in this form of insanity may arise not only from

the fear of poison being placed in it, a delusion which has been already mentioned, but also from a wish to put an end to life, a plan which sometimes succeeds if the friends postpone forcible feeding to too late a period.

As patients range from the extreme gloom of profound melancholia to the other end of the scale, the excited exaltation and foolish hilarity of the fatal disease which we term general paralysis, so will the delusions be tinged by the prevailing feeling and represent the ideas which are characteristic of it. Midway between these extremes we find a number of patients whose insanity and insane delusions are marked not so much by despondency as by anger, suspicion, fear, and anxiety. Men accuse their wives and wives their husbands of adultery; accusations of fraud and robbery are hurled against relatives, partners in business, employees, and servants; delusions of conspiracy are common, and the patient not infrequently appeals to the police for protection against his imaginary enemies. The ideas of suspicion may be carried to any length. Very common are the delusions about electricity being applied to the body by means of wires concealed in the walls or under the floors. One lady had the lightning conductor removed from her residence, and numbers of the floor boards taken up to look for the wires. The same lady had the delusion that people about her were able to ascertain her thoughts, even when they were a long way out of earshot. These delusions point to a condition of great nervous agitation and unrest. In the case of a delusion, such as the last mentioned, we have no difficulty in recognizing the insanity; but when the accusations are of a kind which may possibly be true, such as charges of adultery or fraud, there may be great difficulty in coming to a conclusion at a single interview if the parties are quite unknown to us. And yet many of these patients are very dangerous. Being in a state of anger and suspicion, they are not unlikely to attack the objects of their fancies or those who are charged with the care of them, whom they look upon as the emissaries of the former. Many a murder and suicide has been committed by men who, having a delusion about their wives' infidelity, have killed them first and themselves afterwards.

Lastly, we have delusions marked by exaltation, and these are always to be looked upon as very grave, for they characterize those who are suffering from general paralysis, and when a man between thirty and fifty-five years of age suddenly announces that he is a personage of great rank, wealth, or strength, we must consider the case to be one of great suspicion. On examination of such a man it may very likely happen that we find physical symptoms of paralysis and organic change that point to cerebral disorganization which has al-

ready begun and will advance slowly to death. Frequently, however, we see patients whose mental condition is one of exaltation, who think they are princes or dukes, or that they have invented something which is to yield them a large fortune; they may even think themselves the saviors of the world, yet may turn out to be not general paralytics, but simply persons with mental exaltation and ordinary mania. We must believe, however, that the pathological state of their brain is very nearly identical with that of the general paralytic, and that there is but the faintest line of demarcation between them. This agrees with what Bevan Lewis says, that the dissolution here is to a greater depth than in the melancholic. "An overaction on lower planes," as Hughlings Jackson would term the state to which we allude, "characterizes these maniacal states in the intellectual sphere, revealing a profound failure in object consciousness." The delusions will vary from mere boasting and self-assertion to the wildest fancies. There is intense happiness and satisfaction and the most profound conviction that the patient is right and every one else wrong. The prognosis is less favorable than in melancholia, especially if the delusions are not transient and changing, but fixed and permanent, when they are likely to become chronic monomania, and all such people, owing to their conceit, are difficult to manage without legal restraint.

Hallucinations.

Not only delusions but also hallucinations are constantly found in the insane, and require the most careful consideration because they are found in the sane also, and this will be raised as an objection whenever in a court of law we bring forward an hallucination as an evidence of insanity. It is quite true that they occur in the sane, but in my experience they occur when the sane person is out of health, and point to nervous disorder, though not necessarily to insanity. A case I have already mentioned is that of a lady well known to me who when out of health always saw a cat sitting on a particular stair of her house. She was not averse to cats nor afraid of the spectral cat, but it was to her a token that she was out of health; tonics and wine removed it, to return when next she fell into a like condition of weakness. Here there was no defect of eyesight, her visual centres and visual apparatus were in perfect order, and everything else in the phenomena of vision went on as usual, but the reduction of some portion or other of her brain caused this cat to appear. Why a cat? it will be asked. Why not a dog or a rat or a mouse? We are unable to say, for we know but little of the pathology of hallucinations. I have known a patient plagued by an hallucination of hearing in the

form of church bells which went on continually during the day. This person was not insane but was suffering from a high fever with a temperature of 105°. When the temperature declined the church bells ceased. She was able to realize that it was an hallucination because she knew that there was no church or building anywhere in the neighborhood whence the sound could emanate, but the annoyance was as great as if the bells had really been rung. This hearing of church bells is not uncommon in cases of fever, and, as is well known, deafness sometimes occurs in the same cases.

In the *Journal of Mental Science* (Vol. XXVII., 430) is a paper by Kandinsky, a Moscow physician, who was himself insane for two years and had hallucinations of all the senses except taste. In the first month of his illness there was no hallucination, but an irregular mental activity, a race of delusions and involuntary thoughts. The hallucinations began after the brain was exhausted by the rapidity of thought, and an anæmic condition was produced through voluntary abstinence from food. He agrees with Meynert that hallucinations are no proof of excitement of the cortex, but rather a proof of the abatement of its activity. This theory bears out my own observation of the two cases I have just enumerated.

The occasional hearing of a "voice" is sometimes the only symptom of insanity noticeable in a patient. I have known some recover apparently entirely from an acute attack, resume their places in society and attend to their business, and yet retain this remnant of disease. They may be able to recognize it as an hallucination and disregard it so long as they are in good health, but if this fails, then the "voice" torments them and may drive them to homicide or suicide. Now in these people all the apparatus of hearing, external and internal, and the centres of the brain concerned with this sense are in perfect order, able to receive all that comes to them and to store it up in memory, so that it is difficult to conceive that these centres can be diseased, or that the seat of the hallucination is the same as the healthily working organs. We are in truth in ignorance of the exact pathology of these symptoms, and the belief that they are due to disturbance of the highest cerebral centres has no more foundation than has the opinion of those who think them due to lesion of the external organs of sense, because hallucinations of sight are perceived by persons suffering from cataract or those of hearing by people who are deaf. Hallucinations must be closely allied to delusions because they correspond to the prevailing feeling of the sufferer, the gloomy man seeing sights and hearing voices which are in harmony with his mental condition at the particular time. And as the whole mind may be absorbed and overwhelmed by a mass of delusions, so may it be

overpowered by hallucinations and unable to pay attention to anything else.

The hallucinations of the insane which have to be considered are those of sight, hearing, taste, smell, touch, and the muscular sense. Sometimes two or even three of the senses are affected at the same time. Among the insane as observed in asylums those of hearing are the most common, those of sight coming next and being much more frequent than those of the other senses. But if we were to enumerate all the sick persons who suffer from them, those whose malady is delirium tremens, post-febrile mania, delirium of fevers and acute disease, and the delirium of young children, it is probable that the hallucinations of sight would equal if not exceed those of hearing, the latter belonging not to the very acute but to a later stage of the insanity.

Hallucinations of Sight.

These may be merely flashes of light, colors or fires, or objects, as faces or animals. The man with delirium tremens sees rats, snakes, or other creatures crawling about the room or bed, these being almost always in motion. The fever patient too picks imaginary objects from the bedclothes, and this is rightly held to be a sign of evil omen and impending death. In all these patients there is great brain exhaustion and often sleep has been absent for a long time. The hallucinations have manifestly a close connection with an exhausted and ill-nourished cerebrum. Refreshed and revived by sleep, it loses these terrifying phantasms, which vanish as the acute disorder subsides.

Those which we meet with in less acute cases are often visions of the supernatural, angels or devils, or the Deity, or birds or dogs. Sometimes patients declare that they have seen some friend or relative in the preceding night or day. One gentleman constantly declared that he saw me somewhere or other the day before, the whole being purely imaginary. His is a very chronic case, he having been upwards of fifty years in an asylum, and his delusions and hallucinations vary so that his medical superintendent tells me that he could write a fresh certificate for him every day. Old people see strange sights; one old lady of seventy-five declared that she saw in her bedroom one night her nurse confined of twins and that a Roman Catholic priest came and baptized them both, and to this she adhered for weeks but finally lost it and recovered.

It is sometimes very difficult to say whether certain false ideas are hallucinations of sight or delusions. A patient declares that I am some one else, not a person he has never seen but some one he knows, his father or his brother. There may be no resemblance between the two, but he persists in his assertion. We cannot say that this is an

hallucination or illusion of sight. It has nothing to do with the latter, but is a mistaken idea and is akin to the common delusion that the patient is not his real self but some one else. Frequently these persons declare that those who visit them are not the real husbands, brothers, or sisters, and yet at the same time they will ask questions about others at home, showing that the delusion is mental and not optical.

What is the prognosis as regards hallucinations of sight? Occurring as they do in the acute rather than the chronic stages of insanity, they are not of serious import, for with the acute state we expect them to depart and during this it is of little consequence what hallucinations are met with, if other symptoms are favorable and the strength is maintained. How little recovery is precluded by them we learn from the observation of delirium tremens. Where hallucinations of sight remain after the acute state has passed and the case has become chronic, we shall find, I think, that in the majority of instances other hallucinations exist also, especially those of hearing. That the prognosis here is very unfavorable is beyond question, but it depends more upon the mistakes of hearing than those of sight, and the history will decide for us whether it is a recent or a chronic case. These hallucinations constantly occur in the dark and are seen even by blind people, which proves that the external apparatus of vision is not the seat of the mischief; some by closing the eyelids or covering the eyes can prevent them. By association of ideas and by being accustomed to see nothing when the eyes are shut, they do not see the phantoms of their imagination.

Hallucinations of Hearing.

These are both the most common and the most important of all the perversions of the senses found among the insane. They are important because they are symptoms noticed not merely in the acute stage of the disorder when the patient is under care and treatment, but at a time when he may be thought by many to be recovered and fit to be set at liberty, important also because they are very difficult to eradicate, often very difficult to detect; and if they vanish, and we trust that the patient is well rid of them, they are apt to return without warning of any kind and make life a burden to the sufferer. These hallucinations are not specially confined to the acute state, as are most of those of sight, neither do they indicate the condition of nerve exhaustion with which we believe the latter are connected. Yet in my opinion they have their origin almost always in some acute or subacute attack, which may have long passed away and left these "voices" as a relic and uncured symptom.

Such an attack should always be suspected, for it may be argued, and probably will be urged in a court of law, that hallucinations occur in the sane and that the mere hearing of a "voice" does not constitute insanity. But if we can trace the origin of such hallucinations and refer them to an undoubted mental disorder, whether mania or melancholia, the nature will be disclosed and we shall be satisfied that they are insane fancies and the outcome of insanity.

The hallucinations in almost every case appear in the form of "voices," voices of invisible people speaking to or about the patient, and almost always in uncomplimentary terms. When I am told by any one that he or she hears people talking and I ask what is said, I hear that accusations are brought up of crimes of all kinds, frequently most horrible, or that suggestions, or even orders to commit such crimes, are communicated in this way. It is of no use to tell such a person that these sounds are imaginary and subjective and are all inside his head. The hearer thinks that they come from the next house, or if the house is detached, then from some one outside by means of wires, tubes, or telephones. They are so real that while we are talking to the patient we may see him start as he hears the voice, or break off what he is saying to listen and perhaps reply. And while conversing with a lady amicably and pleasantly I have seen her suddenly change countenance, and with an expression of fury rush at me or the attendant in obedience to a voice which she has just heard.

Obscure as is the pathology of insanity generally, no portion of it is so mysterious as that of hallucinations of hearing. I have a lady under my care at the present time who is rational, intelligent, well-read, well-behaved, who can sit at table behaving like any other sane person without a trace of any mental affection or eccentricity. Suddenly she will leave the table and go to her own room, and there she will shriek and execrate the "voices" and make a terrible noise for perhaps an hour, when she will come back and quietly join her companions. This noise occurs almost every night, lasting two or three hours, and occasionally in the daytime. She will not talk about it, though she is quite aware of the practice, and I do not know who it is whom she imagines to be persecuting her. She will not have any one in her room at night, and likes to have the door locked on the outside. Here may be quoted the words of Dr. Hyslop.[40] "When we reflect that a pathological state which would account for morbid influences determined centrally fails to alter, modify, or pervert in any way the normal functions determined from the periphery by external agents, we feel confused, and must confess that such pathology is for the present incomprehensible."

The difficulty in dealing with these voice-hearing patients is that often there are no other symptoms of insanity, and they appear but for this quite well. And yet with all the appearance of perfect mental health a "voice" suddenly calls out a filthy or opprobrious epithet and the hearer straightway shoots an unoffending bystander believed to be the utterer of the word. This happened not long ago in the streets of London. The difficulty in forming a diagnosis of this insanity lies in the apparent sanity of the patient in every other respect, and very often in the secrecy which is preserved with regard to the voices. It appears as if he was under some fear or some compact which keeps him from revealing the fact that he hears them, though he thinks he must implicitly obey their commands, and it may require very close watching and observation when he thinks himself alone and unheard to enable us to arrive at the true state of the case.

It is also at times difficult to say whether a false belief should be called a delusion or an hallucination. Thus a man may have an idea that he is slandered and his reputation taken away by known or unknown persons, and he may tell us in what he is slandered and how he is being wrongfully accused of theft, or fraud, or unnatural crime. And another may hear "voices" saying the same thing. Either is evidence of insanity, and shows marked mental aberration; but for the prognosis there is all the difference between the former—which is a mere delusion and a common one and will in all probability pass away—and the latter—which is an hallucination. This is more serious, and if it has lasted any time and is the outcome of a more acute state, it is a symptom of very unfavorable omen.

Who are the patients in whom we find these hallucinations? They are the young and middle-aged rather than the elderly. They are rare in climacteric melancholia and in fact in all melancholia, the delusions of which are numerous enough but are not complicated by hallucinations, and for this reason, perhaps, among others patients recover from melancholia even after many years. The cases in which they are common are those of the so-called "idiopathic" insanity, in which young people strongly predisposed at the age of adolescence break down and never emerge entirely from the mental disorder. They are more common in women than in men and are frequently found in connection with alcoholic excess, not delirium tremens, but insanity produced by long-continued tippling.

There is a class of patients who have hallucinations of hearing, yet do not hear voices but sounds. This is a less formidable disorder; we may have more hope of its disappearing, and if it does not, it renders the patient less unhappy and less dangerous to himself and others. The complaint is that noises are made in the next room or

the next house for the purpose of annoyance, or that blowpipes are constructed in the wall, under the floor or in the chimney, and that blowing or whistling goes on at all hours. The patient may be much tormented by it all and take various steps to prevent it, such as appealing to the police or the people next door, but this is a different state from that of the man who hears a voice commanding him to commit homicide or suicide and straightway obeys it. These "noises" may subside and disappear for years.

Hallucinations of Taste.

Many patients have fancies about food or medicine which may be called hallucinations of taste, but are more often of the nature of delusions. When they assert that poison is put in their food, it is not that they think they taste it, but, having the delusion that the food has been tampered with, they refuse to taste it at all. At the present time an elderly lady has the idea, and has had it for upwards of three years, that the meat provided for her is human flesh. In many respects she is rational and able to visit and travel, but to this idea she adheres, holding it just the same whether it is a leg of mutton, a fowl, or a rabbit. But she eats it all in spite of her fears. Another old lady while in an acute stage of melancholia thought that her food was mixed with excrement, but this passed away after two or three weeks; all this is the outcome of mental expectancy. Thinking that he is going to be made to take unwholesome food, the patient asserts that something or other nasty or poisonous is placed in it. Something may depend on the foulness or dryness of the tongue and disorder of the alimentary tract, but genuine hallucinations of taste are, I believe, rare.

Hallucinations of Smell.

Much the same may be said of hallucinations of smell that has been said of those of taste, though in my experience the former are more common, but it is very difficult to separate them from delusions. In melancholia the digestion is so disordered and the breath so fetid that the patients must frequently experience a foul taste in the mouth and a foul odor from the breath. Projecting this subjective sensation to some exterior and objective cause, they may assert that they perceive a smell of dead bodies or graves, or because they do not feel any inclination for food they will declare that it smells offensively. They seldom mention any pleasant odors, and it is generally melancholic people who complain. Many of them have the delusion that they are suffering from some loathsome disease, and as a result of this they imagine that they exhale an offensive odor, and object to sit on a stuffed chair or sofa lest they should contaminate it. These are de-

lusions of the melancholic condition and pass away as the patient recovers. I have never known an hallucination of smell remain as a solitary symptom in the way that we find the "voices" remain as hallucinations of hearing in persons otherwise recovered.

Tactile Hallucinations.

All manner of painful and neuralgic sensations may be experienced by the insane in the skin of the various parts of the body or in the viscera. Those who are not insane, but hypochondriacal or hysterical, come to us with endless complaints of nervous pains, and refer them to some ailment or other, or seek relief from quacks and advertised remedies. The insane put all such pains and sensations down to external causes. If they feel an itching or formication of the skin, they imagine it is due to vermin; if they have a pain in the head or arms or legs, they will declare that they have been knocked about by the attendants or their arms or legs twisted, and it is often difficult to convince both them and ourselves that this is all a delusion. In almost every case of acute mania in young women we find more or less sexual excitement, and this may give rise to what may be called hallucinations of their having been indecently assaulted or ravished. A patient of mine who suffered from alternating insanity used to declare in the maniacal attack that the female attendants were men and that she was assaulted by them every night. Dr. Clouston mentions a lady who had a chronic uterine tumor. She showed her insanity first by going to her clergyman and making a confidential report to him that her husband had given her syphilis. The uneasy sensations connected with the tumor had given rise to this idea. He also mentions a man with disease of the rectum who maintains that people come at night and commit an unnatural offence. And he remarks that bodily causes of delusions should always be looked for.

When a bodily cause, such as the above, is the origin of the hallucination or delusion, recovery is not likely to take place unless the cause is removed. Many have no bodily disease, but mere neuralgic cutaneous pain or sensation is enough to produce the fancy, and like all neuralgic pain it may be intermittent so that the delusion is not always discoverable. I have a chronic patient who complains at intervals that people come and "tick" her head. It is difficult to understand what she means by the "ticking," which appears to be some kind of tapping, not causing great pain but rather annoyance. She does not always experience it, but complains bitterly of the imaginary people who inflict it on her. She is rational in many respects and able to live with a family, and has no ailment or disease in any part of the body which can in any way have given rise to the

idea. One patient, who probably was cold, declared that the servants had put water in his bed; another whose head was hot asserted that pepper had been put in his pillow. All these subjective sensations are converted into accusations of one kind or another. They are of little consequence except to show the deluded state of the mind and the inability to understand their origin, but they are apt to be believed by the relatives or friends who think that these things have really been done.

Hallucinations of the Muscular Sense.

These are in some respects the most important of all, if we are to believe with many that through the muscular sense the impressions of accomplished muscular movements are conveyed to the brain, and that through it the acquisition and realization of speech is made. This is the view of Cramer, and with him Klinke agrees and believes that abnormal sensations in the tongue and throat may arouse delusive fancies leading to derangements of speech.[41] "The sense of sight," says Bevan Lewis,[42] "is pre-eminently interwoven with the muscular mechanism involved in our perception of objects," and further he tells us that "we must distinguish between that portion of the muscular element which enters into our higher intellectual concepts and that grosser factor of the large musculature of the limbs, etc., which subserves the purposes of locomotion and coarse movements." To examine the former would be to analyze the origin of almost every delusion, and this would be beyond our power, but the latter is that which presents to us the ordinary hallucinations and perversions of the muscular sense. These are such ideas as that the limbs are twisted or torn, that they are disjointed, that the legs are tortured or frozen or made of brass, and the like. Some may even think that they are paralyzed and cannot move at all, and the idea of galvanic shocks and currents may in the same way arise from pains in the limbs due to paralysis or alcohol. Hyslop thinks that "the general paralytics who say they have walked millions of miles, or who feel that they are treading on air, have probably some change in the sensibility of the articular surfaces, which act in reality as predisposing factors of illusory states. The sensations of flying through the air, of extreme buoyancy, or having leaden limbs, difficult movements, etc., may all be explained from this point of view. Those abnormal subjective sensations, however, in which the body or limbs appear to shrink or expand would be better explained as modifications of the cutaneous and general sensibility" (*op. cit.*, p. 286).

Dreams.—There is a great similarity between dreams and hallucinations—of the latter it may truly be said, "they are such stuff as

dreams are made of." When in good health our dreams are short and, making but little impression, are forgotten almost as soon as we wake. The mind is sound and deep sleep suspends its action altogether in all its parts, in thought as well as in the senses; but when sleep is not deep, and some cause or other from within or without the body disturbs our rest, then visions or sounds, like the hallucinations of sight and hearing, may arise in the half awake brain, and, according to the state induced, may be of a pleasant nature, or, on the contrary, may be frightful and tormenting. Like hallucinations they may grow out of the events we have been passing through, and may be so vivid and so real that we have some difficulty in realizing for a certain space of time that it has been a dream. Like hallucinations and delusions of the insane, dreams always concern the dreamer. We do not dream of other places and other people unless we ourselves are there to see or to hear. Almost all dreams involve the sense of hearing or seeing, rarely of smell or taste, and we know that the hallucinations of the two former are much more common than those of the two latter. The dream vanishes on waking. It may take a certain time to make sure that it has been a dream if ill health has caused it to be very vivid, and impaired the power of recognizing that it was only a dream. So the hallucination of the sane man is known and recognized as a passing and unreal thing. But the hallucination of the insane person and the vision of the dreamer while asleep are real, and are not recognized as impossible or absurd, because in neither is the whole of the mind working in a healthy and normal way. In sleep a portion only is at work. Judgment and comparison there is none. We are frightened by impossibilities, or not astonished at all at things equally absurd. And so in the insane the mind fails to appreciate the hallucination because the different portions of the mind do not work together, and comparison, perception, and judgment are out of joint.

The Acts of the Insane.

The delusions and hallucinations which have been called the false beliefs of the insane lead in the majority of cases to insane acts and conduct, and it is the latter which calls for the interference of authorities or relatives, according as the insane acts constitute a danger to society at large or to the individual himself. It is important to review the acts which most commonly follow the delusions, for the latter may often be discovered by the resulting conduct, even though they have been hitherto unsuspected. And acts which are not of themselves convincing evidence of insanity may become so by being explained or justified, according to the delusions or hallucinations of the individual.

Insane acts may be divided into those which affect the person and health of the patient or his property, and, secondly, those which are directed against others. Under the first may be considered such acts as stripping off clothes and refusal of food, fantastic dress, suicide, self-mutilation, habitual drinking, squandering, alienation, or destruction of property. Under the second may be placed homicide, wanton violence and mischief, arson, rape, unnatural offences, annoyance by postal cards, and many other similar iniquities.

Stripping off Clothes.—It is very common for the insane to strip off their clothes either entirely or in part. We are constantly told that a patient wanders about his or her house with scarcely any clothes on, to the scandal of friends and servants. This is often done without the slightest regard or any consciousness that it is indecent. The restlessness engendered by the disorder prompts the sufferer to leave his room, and the attention is too much absorbed by the thoughts which crowd the mind for him to dress in the accustomed clothing. "Clothed and in his right mind," denotes the sane man; the insane is often unclothed and in this state may wander not only about the house but into the street, and many a "wandering lunatic" has had to be covered by a policeman's great coat before he could be taken home.

Patients will wander about half dressed who are not in an acute state of insanity, but many who are suffering from acute mania or melancholia or the acute stage of general paralysis will strip off all clothing, or tear to pieces all that is put on them, either to get rid of the feeling of restraint or because of some heat of skin which clothes aggravate. Others, too, in another phase of the disorder will destroy everything in the shape of clothing as well as the bedding, sheets, and blankets from pure wanton love of destruction, just as they will smash windows or furniture. These patients do not in very many cases smash or tear owing to any delusion, but from an insane desire to destroy, and sometimes a restless craving for something on which to exercise their fingers, teeth, or nails. They will go on tearing till they have reduced the bedding or clothing to the smallest fragments, and I have seen a black cloth coat become a mass of shreds so that no one could possibly guess what it originally had been.

Others will take off their clothes through some delusion. Religious melancholics think they are bound to deprive themselves of them to give to those who are in want, or will think them too good to wear, or that they cannot afford them, or will say that it is their duty to mortify the flesh and expose themselves to cold for the same reason that so many refuse food. A lady lately under my care had the delusion that she was going to be turned out of her house to wander

about the streets naked all night, and this thought of being naked, though she dreaded it exceedingly, became such a dominant idea that she prepared for it every day by endeavoring to take off all her clothes in her own drawing-room, and nothing but the constant presence of an attendant prevented her from doing so. The delusion and endeavor passed off in about a week.

Demented patients will often take off or tear their clothes from the fidgety restlessness which characterizes some of them, especially those who suffer from periodical excitement. These are chronic patients, but with this exception our prognosis need not be unfavorably affected by this practice, which is seen for the most part in acute insanity, from which so many recover. Even those who in acute conscious mania destroy for the sake of destroying, will give up the habit if they are prevented from indulging in it for a time. The treatment must vary according to the case. An acutely delirious patient must not be allowed to go naked if the weather is cold. A suit of strong and tough material, made to lace up the back, must be placed on him or her, with an adequate supply of underclothing, and if the sewing is done with stout thread or twine it cannot be broken. Soft and warm boots must be placed on the feet, with locks to prevent their being removed. Another plan is to fasten a strong blanket round the neck and shoulders, making a kind of poncho, impeding, though not confining the arms, and enabling attendants to hold a patient without bruising. This is useful in very acute delirium when the patient's object is to get rid of clothes rather than to destroy them. In acute and conscious mania when the tearing is done for sheer wanton mischief, an attendant should be placed by the patient who shall absolutely prevent his practices, and the hands may even be fastened if the habit is persisted in. Such people know perfectly well that what they do is wrong, and are to be influenced by moral treatment and the withholding of any luxuries as wine, beer, or tobacco in which they delight. Even the demented are susceptible of this kind of moral treatment to a greater extent than many would give them credit for.

Indecent Exposure of the person is a practice indulged in by the insane, and as it is not confined to them but is also met with among the sane, it becomes a question of legal diagnosis, and requires careful investigation. Not infrequently is it the case that men expose themselves to children, and insanity may be pleaded as an excuse for the act. Such occurred not long ago in an elderly and weak-minded man given to drink. Here the unsoundness of mind was manifest, and the plea of irresponsibility was successfully raised. When the act is the result of insanity, it is not likely to be the only evidence of

mental disorder, and even the act itself and the locality may be sufficient to show its origin. For I have known a man who rarely transgressed in this way, but when he did, it was in the most public and crowded place, on board a steamboat or at a solemn function in a foreign cathedral. Women in a state of erotic excitement may do it, but not in public. In asylums it is not uncommon, but the insanity in such cases is shown in many ways, and self-abuse likewise is often carried on in a most shameless manner. I have known this practised by women who were not otherwise insane, and practised almost in public. With many it seems to be a most uncontrollable habit, and one extremely difficult to deal with.

Fantastic Dress.—From the stripping off of dress we may pass to the wearing of an inordinate quantity, to the decoration of the person by all kinds of fantastic ornaments, or the utter neglect of all cleanliness, both of person and clothes. All this may proceed from delusions directly, or may be merely the habits of a neglected lunatic who has been allowed to do what he likes, and has drifted into the carelessness of a hermit or recluse. Some people have an extraordinary fear of cold and will wear a huge pile of clothing without changing it, for fear of taking cold. One old lady had sewn round her body layer upon layer of flannel till she was encased in a complete pad, and this, of course, was never removed. And the same fear causes them to avoid water and washing, and so they will go month after month and year after year unwashed and unkempt. I lately saw a man, of the age of thirty-two, who on two occasions, twelve and fourteen years ago, had been under my care in an asylum, whence he had been removed uncured by a fond and foolish mother. Since that time I should think, judging by his appearance, he had not been washed, neither had his hair nor beard been cut. They hung over his shoulders, hiding his face, and altogether he presented the most extraordinary appearance; the state of the room in which he lived corresponded with that of his person. This was an extreme case, but there are many patients whose dress and appearance are eccentric, who decorate themselves with tinsel ornaments or other rubbish, owing to delusions, and we are often led to the discovery of the latter by what we see on them or in their apartment. Many will eat no food except that which they cook themselves, and thus we find that they have delusions about poison. Others will not leave the house or even the room, and from them we gather delusions about the police being after them for some crime of which they are unjustly accused, or of people wishing to murder them or shut them up. Not infrequently these people have great fear of being placed in an asylum. They may have been there already, or are fully aware that their peculiar mode of life renders it

very probable that they will be taken to one, and like so many other lunatics who are conscious of their condition, they try to make their relatives promise never to send them thither, and some who are weak-minded enough to make such a promise are terribly hampered afterwards when it becomes absolutely necessary to resort to such a step.

The amount of dirt, eccentric dress, or peculiar habits which constitute insanity from a legal point of view may give rise to great forensic controversy, which is especially apt to arise in will cases in which the eccentricity has gone on unchecked during life, and is thought to have affected a will which is disputed after death. One can only say, with regard to such, that every case must be judged on its own merits apart from all others. Much will turn upon the origin and duration of the symptoms. If a person who up to a certain date has been methodical, orderly, and clean, like the rest of his fellows and equals, then undergoes a complete change, severs himself from his surroundings and leads a life of complete seclusion in filth and wretchedness, it is probable that this man's mental condition has undergone a change and is deteriorated. It is also probable that he has delusions, whether he has revealed them or not.

Hack Tuke has given us an interesting history[43] of a man whom he calls the hermit of Red-Coats Green, who lived for a quarter of a century shut up in the same house alone, every window and door being carefully barricaded, and here he was visited by Dr. Tuke, who thus describes him: "I went up to the window of what had been the kitchen, the glass and casement of which had long disappeared, the strong iron bars only remaining. Here the possessor of ample means and a man of at least fair education lived day and night. He appeared to emerge from a bed of ashes (he had not slept in a bed for many years), and I observed that when his room was entered after his death, the floor was found to be a couple of feet or more deep with the cinders which had accumulated. On my appearing at the window he came forward and entered, though with apparent reluctance, into conversation, his countenance being marked by an expression of suspicion. His aspect was quite in keeping with his abode. Unwashed for many years, his skin was not in a desirable condition, the white of his eyes contrasting strangely with the rest of his person. Clothes he had none, only a dirty blanket loosely thrown over him. In the room were a fire, an old table, and numerous bottles. He spoke to me in a low, rather plaintive tone of voice and gave me the impression that he was laboring under a certain amount of fear or apprehension. Part of his conversation, which otherwise was perfectly rational, conveyed the same impression. He intimated that his relations were against him, and I understood him to give this as

a reason why his house was barricaded. So far as I could make out, through his prison-like bars, he was laboring under a partial insanity —a monomania of suspicion or persecution. Several of his visitors agree in the statement that he assured them his relatives, especially his brother, were plotting against him. He never wrote a letter to any member of the family nor to any one else. He had a check book and used it for the payment of some of his bills. When he required money for his own use, his bankers would receive a verbal message and transact business with him. In consequence of his refusal to sign his name to any paper bearing a stamp, as he would not acknowledge the Queen, the receipt stamp had to be added afterwards." He gave away a great deal, sweetmeats, coppers, and gin and water to swarms of tramps. He ate bread and cheese and red herrings, and drank both milk and gin. He had a great fear of poison and gave up milk because he suspected it. On this account he often changed his baker, and after his death nearly a cartload of untouched and suspected loaves was found in his room. He died of apoplexy at the age of sixty-one.

This gentlemen was visited by one of the commissioners in lunacy, John Forster, the biographer of Dickens, and also by Dickens himself, but because he could talk rationally and acutely, they both thought him sane. He was unquestionably insane. As Dr. Tuke observes: "There is the family history, pointing to hereditary predisposition, only wanting some exciting cause to arouse it; the change of character at ten, associated with an alleged physical cause (ringworm suddenly cured), the action as a moral cause of an injuriously indulgent bringing up; there is subsequent to the age of ten constant waywardness and obstinate wilfulness, combined with untruthfulness; acts which occasioned frequent alarm to his family; the necessity at length of legal restraint (he was placed under certificates for two years); freaks of dress and no dress; extraordinary conduct on and after the death of his mother (he kept her body in the house for some two or three months); the persistent notion, if we may not say delusion, respecting the Queen, involving the loss of considerable property; the entire neglect of his dwelling and person; the groundless antipathy and suspicion he felt towards his brother; the delusion that poison was put into his food; his fits of mental depression and his violent passion on the slightest contradiction. But he could converse intelligently on many subjects, such as the classics, Shakespeare, and the literature of the Restoration. His memory was remarkably retentive, and he fully understood the value of money. If a jury had had him before them, dressed like a gentleman, and had not seen the condition in which he lived, it is a question whether they

would have found him insane. A will, which he made some years after his mother's death, evinced no animosity towards his brother, nor did it display any eccentricity or insanity in the disposition of his property.

Excessive drinking is one of the acts of the insane. Much has been written on this subject and various views have been propounded by the writers. It is quite certain that drinking and insanity stand in relation, one to the other, in several different ways. First of all, there is the habitual drunkard, man or woman, who has a habit of drinking, and will get drunk whenever he can, and drink himself drunk. We are perpetually consulted about such people, and asked to see them. I refuse to do this if it is probable that I shall find them under the influence of liquor, and then I am told that if sober they are perfectly sane. This habitual drinking may, if it is excessive, result in delirium tremens, in acute alcoholic insanity, or in chronic insanity, but it may continue for many years without any of these results, and may cause the ruin of a man's business, profession, and prospects. It is for these cases that we require legal machinery to control the patients for such a time as will enable the habit to be overcome.

Dipsomania proper is an insanity, an insane impulse to drink which occurs in individuals degenerated by hereditary taint. They are not insane from drink, but insane before they commence to drink (Magnan). This form of insanity is almost invariably periodical, and may recur after a long or a short interval. Its duration also will vary from a few days or a week to some weeks or months, depending on the quantity of alcohol taken. I knew a gentleman engaged in business, orderly and properly behaved as a rule, who periodically vanished out of sight and went to some low pothouse at a distance from home, where he drank. In about a week or ten days he returned home and went on with his work. This went on for some years till he died, of what disease I have been unable to learn. There is often a stage of mental alteration before the drinking commences, and this is generally depression, so that some have classed the disorder as a variety of melancholia. This recurrence is a feature which is common to other forms of mental disorder and points to the neurotic origin, for in the intervals these persons have no craving for drink and often have an actual aversion to it.

"Between the true dipsomaniac," says M. Legrain,[44] "who drinks impulsively and the common drunkard, there is a very numerous class of drinkers—actual intermittent drunkards—who seem to obey a sort of impulse, but are more like a common drunkard through their pronounced liking for intoxicating drink, and are also like true

dipsomaniacs in consequence of certain psychological characters; as a matter of fact, they are often confounded with dipsomaniacs." For these M. Legrain proposes the name of *pseudodipsomaniacs*, and they are, he says, "patients with a weak will, without energy and easily directed in any direction; actual weathercocks, they appear in the presence of alcohol to be great children incapable of any efficient and energetic action. Nevertheless they strive, and this consideration explains why their excesses occur periodically in a recurrent manner; they resist until some tempting opportunity makes them forget all their good resolutions. They are the victims of occasions which they do not want to avoid, because they love alcohol; they would never become drunkards if it were possible for them to live always under tutelage."

To draw a line of demarcation between these and the true dipsomaniacs on the one hand, and the true habitual drunkards on the other, is undoubtedly very difficult. One distinction which may be made between the first two is that the dipsomaniac, when not under the influence of the paroxysmal attack, is proof against temptation and is no more to be led to drink than another is led to suicide in the intervals between his attacks of melancholia. But the pseudodipsomaniac loves alcohol, and although he may promise repentance and vow that he will never do it again, at the first opportunity his courage vanishes and he falls. These people may fitly be classed among the victims of the so-called *moral insanity*, while the true dipsomaniacs should be ranked among those who suffer from insane *impulse*. The prognosis in the case of the latter is better than in that of the former, for we have to deal with a higher kind of mind, though one clouded by temporary insanity. This we may hope to relieve by measures conducive to the health of mind and body, by mental training and gymnastics, and by a strict hygiene during the intervals of the paroxysms. And when the attack is present, our endeavors may be cheered by the knowledge that it will pass away if we can preserve the sufferer from suicide or other mishap.

Of the morally insane drinker we can have but little hope. We have to deal with a weak mind, the result, probably, like the other of inherited taint, but one which all our efforts will not bring to a normal standard. This condition is permanent, and the sufferer is only preserved from a fall at any time by being propped up by force, moral or physical. It is for these that inebriate asylums are so badly wanted, for these who are quite unable through their infirmity to take care of themselves. The habitual drunkard needs them also, the man or woman who drinks because he likes to drink, who never strives against it whether it is the private tippling or the public-house orgie.

These persons will drink so long as they have money in their pocket, or can turn anything they possess into money. They are the people who spend their wages in drink, are found drunk and disorderly in the street, are locked up again and again and sentenced to short terms of imprisonment which do no good. For them inebriate asylums are necessary and compulsory sequestration. The fear of a repetition of a long sentence may deter them, but nothing else will. They approach the criminal class more nearly than the insane.

Suicide.—Nothing is more common among the insane than a wish to commit suicide, though it is not to be held that an attempt to take one's life is of itself proof of insanity. It has become a fashion nowadays for coroners' juries to return a verdict of temporary insanity in every case of suicide, the practice having been brought about partly on account of the difficulties raised by life assurance companies, and partly to spare the feelings of friends. Yet those who see the patients in a general hospital know that numbers are brought there rescued from the river, or with throats half cut, or half poisoned, who are not insane, and our police courts tell the same story. A great number of such cases may be put down to drink, which is the chief factor in many of the successful as well as the unsuccessful attempts.

The study of suicide in various countries is interesting and has been carefully worked out by Morselli, William Ogle, and others. The statistics show that it is much more common among men than women. Tables in the *Journal of Mental Science* (January, 1890) point out that in this country, from 1861 to 1888, the result as to the liability of the sexes to suicide may be stated thus: among equal numbers living of both sexes there were almost exactly three male to one female suicide. This proportion held good at all ages except at two periods, namely, in the fifteen to twenty and the forty-five to fifty-five year periods. In the earlier of these two the female is actually higher than the male rate. The break in the scale at forty-five to fifty-five marks the sudden shock given to the female system by the menopause, while the exceptional inversion of the male and female rates in the fifteen to twenty year period marks the conversion of the girl into the woman. Dr. Ogle points out that this period is not only that in which the suicide rate for women is higher than that for men, but is also the only period in which the general death rate is higher in the female sex, and is also marked by an exceptionally higher rate of lunacy for women than for men.[45]

If we could have an accurate record not of the actual deaths from suicide but of the unsuccessful attempts, we should probably find that the rate in the two sexes was much nearer than three to one. Men are more determined than women, and in such modes of destruc-

tion as cutting the throat, where some strength is needed, they are more likely to do it effectually; many women are brought to our hospitals with throats slightly wounded. Hanging, which is easily carried out, is not liked by women, who prefer drowning, and many are rescued from the water when they throw themselves into a place where there are people and boats at hand. They prefer poison to bloodshed, but poisons are not easily procured and they make attempts which are frustrated by timely aid, or the poison taken is too weak or makes them sick. Their most effectual method is throwing themselves from a height.

Because the statistics of the registrar-general show a preponderance of deaths from suicide among males, we are not to infer that among the insane male patients are more suicidal than female, though for the reasons I have given there may be more deaths among the former. Any insane person, male or female, may be suicidal, and this very early in the illness, for the majority of cases begin with a stage of depression, even those which later develop very acute mania, and in this depressed stage suicide may take place. The depression may be apparently slight, so slight as not to have become organized into downright delusions; yet the feeling of there being something wrong, he knows not what, or the fear of getting worse and encountering some unknown evil, makes a man weary of life, and so he "shuffles off this mortal coil," preferring "rather than bear those ills he has, to fly to others that he knows not of."

If we have the opportunity of accurately ascertaining the history of the slighter cases, which may be called simple melancholia, but are nevertheless marked by suicidal desire, we shall find in the majority a strong insane inheritance and also an inherited tendency to suicide. This is very prevalent in some families, and is handed on from parents to children, appearing whenever the nervous constitution is lowered by any shock, mental or physical.

The insanity which make us most apprehensive of suicide is acute melancholia with delusions, and these may vary much, yet all seem to point to the same end. It sometimes happens that a man is so low and depressed that he feels himself likely to commit self-destruction, and may express a horror of it and declare that he never will do anything so wicked. He may in this manner completely deceive his friends, who will think that he is quite safe from danger, and yet the next day, perhaps, he will not be able to resist any longer, and will, if not prevented, throw himself from a window or over a staircase. The religious melancholics are very suicidal, for they think themselves too wicked to live, and many imagine not only that they ought to put an end to their existence, but that being so desperately wicked

they ought to inflict all the pain and punishment upon their bodies that they can. A favorable mode of self-injury is the setting themselves on fire, and this they will do in various ways by concealing matches or lighting paper at the fire or candle when the attendant is not looking, and they will endure the pain of burning for a long time without raising any alarm. Another favorite method is swallowing any substance likely to do them harm, as broken glass or china, articles like brooches, needles, or pins. It is marvellous how such things are swallowed by some patients and pass through them without injury; probably every asylum has records of such experiences. The delusion may not be religious; the sufferer may imagine that he is ruined in his fortune or business, and that he, his wife and children are all going to be starved and turned out into the streets barefoot or naked. This idea may prompt him to destroy not only himself but also his family to save them from this wretched fate, and many of the murders of families which we read of in the newspapers are committed from this delusion.

There is also a large number of suicidal hypochondriacs, people who think they have an incurable disease or spermatorrhœa, or imagine they are impotent because their melancholic condition has annihilated in them all sexual desire. There are also some who think they are the victims of syphilis, and point to every speck or pimple on their bodies as evidence of the disease. The constant and haunting dread of this malady often drives them to suicide. In all these different forms of melancholia the patient's condition will vary from week to week or even day to day; to-day he may not be suicidal, his condition is above that level, but to-morrow by a bad night or want of food he may be so "reduced" that his higher centres lose control, and although the delusions may be just the same, the depression is greater and the suicide point is reached. It may even be due to some trouble in the digestive system, such as will cause gloom and anxiety in an otherwise healthy person.

There are besides these melancholic patients many who will commit or try to commit suicide in the early and acute stage of insanity, in delirium tremens, or in epileptic mania. They may even do it to escape from where they are restrained, or to get away from those who restrain them, whom they imagine to be fiends or murderers. They may be subject to paroxysms of mad fury in which they will dash themselves against a wall, into the fire, or against a window, just as others will smash and destroy from a sheer impulse of destructiveness. These people are extremely difficult to treat, and require all the appliances of a well-ordered asylum. They will require a padded room to prevent them from dashing their heads against the wall, and

even this may not be sufficient without restraint if they have a desire to gouge out their eyes.

Besides the suicides which depend upon delusions we find a certain number, I believe a small one, which proceed from what has been called suicidal impulse. I shall have to speak hereafter of impulsive insanity, especially with reference to homicide, but this form of suicidal impulse may be mentioned here. It is found in patients who are not specially melancholic and present no delusions which should make them wish to end their life on earth. The insanity may be well marked and their efforts to commit suicide unceasing; but, on the other hand, we find some in whom the signs of insanity are difficult to detect and the suicidal impulse will be occasional only. A patient may go day after day without any attempt, though opportunities constantly occur, and then when the fears of friends and attendants are allayed, some sudden impulse or some tempting chance may lead him to commit the act. These doubtful cases require great care and caution when after the acute symptoms have passed away the question of discharge arises. Has the patient who was once undoubtedly suicidal lost the desire, or is it likely to recur? Concerning such, no rule can be laid down. In order to get away from the restraint of an asylum patients will dissimulate and deny delusions of every kind, and in the quiet and rest of an asylum the wish for suicide may have passed away and they can truthfully tell us that they have no desire for anything of the sort, yet placed in their old environment, and having to face the world anew, the feeling which was thought to have passed away will suddenly return.

There is one form of insanity which may easily be mistaken for suicidal impulse, but it is that characterized by hallucinations of hearing which have been already described. The "voices" command the sufferer to commit suicide, and he obeys implicitly, but he does not reveal to us that he hears them and so we may ascribe to impulse that which is really the result of delusion. Perhaps the most genuine cases of suicidal impulse are those which occur in the young. Young men and maidens, even young boys and girls, conceive a morbid idea in their mind, an uncontrollable desire to gratify the craving for the unknown but imaginary pleasure of self-destruction, and so it happens that every asylum can bring forward instances of attempts made by the young. Many of them are masturbators, and all may be looked upon as having by inheritance a bad neurotic history.

Self-Mutilation.—Not infrequently we meet with patients who endeavor to damage or mutilate themselves in some way or other, not for the purpose of suicide, but from some delusion or morbid idea. One person will pluck out his eye, following the scriptural precept; another

will try to cut off an offending hand. Not uncommonly the organs of generation, one or all, are removed because they have "offended," and incited the patient to lust or masturbation. In the *Journal of Mental Science* (Vol. XXXII., 44) there is an account of a patient, aged twenty-five years, who two and a half years after admission to an asylum in New South Wales excised the left testicle and five months afterwards the right, which he swallowed to prevent any one else getting it. He became demented, and as his dementia increased he would scratch himself with pieces of wood, stone, or glass, and eventually he appeared ill, and on examination it was found that two months previously he had found a nail, had placed the point against his forehead, and driven it in by bumping his head against the wall. This had quite healed over, but on cutting down a wire nail was found two inches long driven into the skull up to its head. The man died, and on the surface of the convolutions there was a small quantity of pus, and in the substance of the frontal lobe was found a cavity filled with altered blood and broken-down brain substance. Patients will burn themselves in the same way. Lately I saw a lady who had seized a large lump of incandescent coal with her right hand, and a young man who had placed his face on the top of the fire in the dining-room of his father's house.

There are many who damage themselves in minor ways which are very troublesome and hard to deal with, though they are not attended with so much danger. One is the habit so many have of picking the fingers. Biting the nails is common enough even among the sane, but patients will not only bite but pick their fingers till they are raw and bleeding, and will pick sore places on their faces, arms, or body in the same way. Many will pick the hair out from their head or beard, hair by hair, till they make their faces smooth and their scalp bald. One man, not in an asylum, made himself so bald that it was necessary to provide him with a wig, but his fidgety fingers could no more let this alone than his own hair, and the wig very soon had to be sent for repairs. The picking of the face may be serious, and indelible marks may be made in this way, so that it is necessary to keep the hands in padded gloves till the habit or trick is overcome. One lady picked away all the septum of the nose for want of such measures being adopted.

Talking to Self.—Another act of the insane is constant talking to self. Sane people do this also, and it is not uncommon to meet a man in the street talking volubly to himself as he walks along. But he does not talk to himself when he is in a room with others as the insane do. Some talk incessantly, converting their thoughts and ideas into words, and as the former are an incoherent jumble in many

cases, so will be the latter a farrago that it is impossible to remember or write down. Others will talk out loud to imaginary persons and answer imaginary voices. We may by listening to these conversations gain valuable information concerning the individual, and discover delusions and hallucinations which would not be revealed if we directly questioned him concerning them.

Mutism.—Besides the patients who talk too much and talk to themselves, we not infrequently see others who will not talk at all. It sometimes happens that we are called to examine some one for the purpose of a certificate, who remains absolutely silent. Not a word can we get in answer to questions, nor will the patient write or convey to us in any way his reason for refusing to speak either to us or his friends. I have known medical men find a difficulty in signing a certificate in such a case, but I look upon such mutism as sufficient evidence of insanity coupled with the history we hear from friends. For this silence is not likely to be the only or the first symptom of insanity; it is not found in the initial stage, and we shall probably learn a good deal if we make inquiries. Concerning it all we may question the patient, and ask him whether it is true and accurately related. If he refuses still to speak, we may conclude that his mind is so disordered that he can take no notice of that which concerns him so closely, or that from some delusion he will not give utterance to what is occupying his mind. I have known this silence preserved for many years. One gentleman whom I have attended for upwards of thirty years has never spoken to me the whole time, and only a rare monosyllable to any one else. He occasionally mutters to himself, but not so as to be intelligible. He requires to be washed, dressed, and fed, but is not demented, and can draw very tolerably in water colors. Friends sometimes think such patients aphasic, or that they have something the matter with the vocal organs, and I have known a girl examined by eminent laryngologists with this idea. She talked fast enough when her mute fit had passed away. Many old, demented people hardly ever speak, never perhaps unless spoken to, but these can all say a few words. The mute patient is almost always under a delusion that he must not speak, and this may make him silent even for years. There is nothing to be done in these circumstances, and persistent attempts to overcome the taciturnity are more likely to prolong it than to be crowned with success.

Wasting Property.—Besides damaging his person in various ways a lunatic may squander his property or enter into speculations and contracts which he never would have done had he been in his sober senses. Here it will be seen that the spending of money recklessly and needlessly is a question of degree, and where it is done to some but not to

a very large extent, the insanity, whence it proceeds, will require additional evidence before we can use legal restraint. There are many patients about whom there can be no doubt. They think themselves millionaires, will make us presents of houses, horses, or diamonds, and amuse themselves by writing to every tradesman who advertises in the papers, and ordering half his stock. But others, who may be rich men, will spend money foolishly, or in debauchery or some fashion alien to their custom, and yet not to an extent which will seriously cripple their income. Here controversy may arise, and the same may be said of the senseless extravagance of the weak-minded or imbeciles, who may dissipate a large fortune in a few years in drunken riot, and yet will be held by juries to be sane because they have no delusions and can behave themselves with propriety when they are being examined in a court of law.

Acts Done towards Others.—By far the most important of these are homicide and homicidal attacks. Besides this we find arson, rape, and theft.

Homicide may be committed by a lunatic for various reasons. All such acts do not proceed from a *homicidal monomania* or *homicidal impulse,* though some do, and these will be considered under special heads; they are the rarest of all. Those most commonly met with are the following:

I. Homicidal attacks on attendants are constantly made by patients who have a dislike to those in charge of them, either from delusion or because they are kept in order and restrained by them. They may be made also with a view to escape, or to obtain possession of the attendant's keys.

II. Homicide may be the result of a delusion or hallucination, and this is probably the commonest of all. One of the most frequent delusions is that of persecution. Patients imagine they are persecuted, plotted against, followed, watched, poisoned by persons known or unknown. They will very likely attach such delusions to those they see most of, or who are most closely related, and will attempt to get rid of them and of the persecution by homicide. Others think that some terrible evil is about to befall those they love best, and will put them to death to avert a worse calamity and possibly commit suicide afterwards. This is the history of many a tragedy related in the newspapers. The connection between the crime and the delusion in these cases is not hard to follow. But often it happens that there is no apparent connection. A man may have a delusion, but one which does not appear to lead in any way to homicide. It is not to be concluded, however, that there was no connection because we cannot discover it. To trace the thread of ideas in the mind of a lunatic is a

very difficult task. He may be unable to do it himself or may be reticent and unwilling to aid us. Perhaps months after he may reveal that which led him to the act.

Then there is the large class of patients who have hallucinations of hearing—hearing "voices." These voices worry and persecute them till their lives are insupportable, and as they often imagine them to be uttered by those around, they may shoot or stab some unfortunate and innocent person who is near. Here, again, the hallucination may not be known or confessed, and the apparently motiveless act may be put down to homicidal monomania or impulse when it is nothing more than an act committed under the influence of an overwhelming false belief. I have already spoken of such hallucinations.

III. Homicide may be committed by persons of weak mind, idiots, imbeciles, or demented, for some silly or imaginary cause of offence or from mere imitativeness. An idiot may kill a child because he has seen a fowl or a sheep killed. An imbecile may commit a murder in order to gain notoriety and be talked about in the newspapers. Of this a notable example came under my notice a year ago which will be mentioned in the section on imbeciles.

The insanity of these three classes of homicides is not to be questioned. Here and there a patient may conceal his delusions, and we may have some trouble to discover such symptoms as hallucinations of hearing, but in by far the greater number of cases indications of insanity will have been noticed prior to the committal of the act.

There are others, however, who have not been thought insane before the homicide, which has been the first thing to call attention to their state of mind, and these also may be divided into three classes.

IV. Homicide is frequently committed by epileptics. Many epileptics are not considered insane, and if the fits are not numerous, they may pass muster as sane people and mix in society and discharge the duties of ordinary social life. But it often happens that although in the intervals between the fits the mind may appear sane and sound, yet for a certain period prior to a fit or a certain time after, there may be considerable mental disturbance which may even lead to homicide. Those about such a patient may know little and notice little of the epilepsy. The attack may be extremely slight, one of *petit mal* only, and may have entirely escaped observation. The French speak of an *épilepsie larvée* or masked epilepsy, where no fit is discernible but mental disturbance is supposed to take its place. Whether this be so or not, it is certain that the fit may be very slight, may occur in the night or when the patient is alone, and so be unnoticed; and a homicide may be committed in the strange automatic

state which follows such an attack, and there will be no knowledge or recollection of the deed when this state passes away; and in the furious mania which succeeds a number of fits, homicide may be committed under the influence of delusions or hallucinations.

V. Homicide may be committed by a person who has a paroxysm of acute insanity which may come on quite suddenly. The patient may even wake out of sleep and at once become delirious, and under the influence of some frightful dream or in a panic of fear caused by some delusion or hallucination, may attack any one who is in the same apartment. Such a paroxysm may soon pass away, the whole being an example of what has been called *transitory mania*, and afterwards there may be very little consciousness or recollection of what has passed and the patient may be horrified when he hears of it. The furious mania produced by alcohol may likewise lead to homicide, as it frequently does to suicide. Such people may not suffer from delirium tremens; they are what has been called "mad drunk," and they may commit any kind of violence while in this state, which yet may pass away in twenty-four hours if liquor is withheld and sleep returns.

VI. Besides all these we have the homicides which are committed under the influence of "homicidal impulse" or "homicidal monomania," not a large, but a very important class, concerning which much contention has arisen in courts of law. This variety will be considered under the head of impulsive insanity. That it exists is now generally acknowledged by alienists, but many cases are placed in it which for want of an accurate diagnosis should come under one or other of the five above-mentioned varieties. Where delusion cannot be discovered, where there is no history of epilepsy and the weakness of mind is not very pronounced, we are apt to have recourse to the theory of homicidal impulse. A careful search into the history and antecedents of the patient, and a close cross-examination may reveal a motive which has been hitherto unsuspected.

There are other acts committed by insane people which hardly deserve to be placed in a category. One is the so-called *pyromania* or arson, a love of setting things on fire, which may be noticed in some patients. There may be various motives for this. I have known a man set fire to the window frame in order to escape. Others will try and set fire to the room, furniture, or bedding with the same object, or with suicidal intent. It is a common trick to throw things into the fire, and many will get rid of all their handkerchiefs in this way, and in these days of open and unguarded fireplaces it is difficult to prevent them. But all these are among the dangerous acts and tricks of the insane and are not characteristic of any one form of in-

sanity, but may be looked for wherever lunatics are kept in restraint.

Erotomania, Nymphomania, Satyriasis.—Under these names, which are used sometimes as synonymous, sometimes as indicating different states, we now place the disorder of patients who commit acts of indecency or indecent assaults on others of the same or the opposite sex. Grave questions will arise as to the responsibility of these persons. About some there can be doubt; many of our young female patients when in a state of acute mania are extremely erotic and their acts and talk are most indecent, but all this passes away when recovery takes place or the acute stage is over. But the chronic form is found in the degenerate, and is a sign of degeneracy both in men and women, whether it occurs in those who have been weak-minded from childhood, or have had attacks of insanity leading to a degraded and demented condition, or have arrived at the latter through age. It may be extremely difficult to fix the degree of irresponsibility in these cases. Not every pæderast is insane, neither are all who assault women or expose themselves to children. We must look for symptoms of insanity besides the act, and we shall frequently find them, but not always. At any rate they are not cases in which the question of homicide or suicide is raised. If the offenders are held responsible and are consigned to prison, they will be under medical observation and the insanity, if it exists, can be detected.

Kleptomania is a name given to stealing committed by the insane, and is, according to some, an insane impulse or monomania existing in an otherwise healthy mind. Like the last-mentioned, this thieving is not uncommon among the insane, but the insanity is manifested in other ways, as we shall find upon close examination, and acts of theft are committed by well-dressed people who are not insane.

When we are consulted about such acts done by persons who are supposed to be insane, and to whom the value of the article stolen is of no moment, we may suspect one or other of several things:

I. If the individual is a man between twenty-five and fifty-five, we must examine him closely, and may possibly discover symptoms of early general paralysis in which stealing is by no means uncommon. A marked case of this kind was lately brought under my notice to which I shall refer later.

II. A patient may be in a state of what is called *moral* insanity, insanity, that is, without delusion, where the chief symptom is an alteration and degradation of character, but without delusion, either because the stage of delusion has not been reached, or has been reached and then has passed away, leaving the individual half cured.

Such a one will justify insane acts of various kinds and among them thefts.

III. There is the *imbecile* class, which will be described later on. These weak-minded people are given to thieving, as they are to lying, drinking, and frequenting low company. To fix their irresponsibility is extremely difficult. In the lower station of life such thefts bring them to prison; in a higher they come under our notice and much care is required to pronounce an opinion upon them.

From time to time we read of ladies appropriating articles in shops, and it is said that pregnant women have longings which lead them to do so. Such are not insane; they are probably people of weak or ill-regulated minds, but the plea of insanity cannot be raised unless other symptoms are discovered.

CLINICAL VARIETIES.

Melancholia.

In describing the various kinds of insane patients it is fitting that those should come first whose mental symptoms are marked by depression. They are by far the larger number of all that are met with in ordinary practice and are the "out-patients," so to speak, of the department; they consult us, or we are consulted about them, in our own houses, and many recover without being placed in a special institution. Depression will range from mere low spirits to the most acute delirious melancholia, and the different degrees have received different names. We read of *simple* melancholia, of *delusional, hypochondriacal, religious, suicidal,* but there is no marked line of demarcation, and a patient may advance slowly or rapidly from the first stage to the last. In the earliest the patient, or more probably his friends, will consult the family medical adviser, who will be told that for a longer or shorter time there have been noticed an alteration and depression, an inertness and inability to attend to business, a want of interest in, or absolute dislike to, those things which formerly were a pleasure. This we may hear from the patient himself, but more often from others, while he himself pooh-poohs the whole matter, declares there is no alteration, tries to avoid the physician, and rejects his advice and treatment. As he and his friends usually differ in the account of his symptoms, so will they differ in the cause which either gives of the disorder. Here it is probable that the cause assigned by the friends is the true one rather than that which we receive from the patient, for the latter is prone to conceal or minimize the true origin and to exaggerate some circumstance which is a concomitant rather

than a cause. The friends tell us he is worried and overworked; he himself maintains that he has had pecuniary losses which have greatly depressed him. But we hear that these have been trifling and such as would not have caused the least trouble or anxiety had he been well. He will not allow that he is overworked, because he is afraid that he will be ordered to go away and leave his business, which he thinks will go to pieces in his absence, not being able to see that he is quite unfit and unable to conduct it with advantage in his present condition.

Without the assistance of friends we can do little in these cases and are always in doubt and difficulty when a patient presents himself alone, and we have to rake about among the scraps of information which he gives and try to elicit the truth. Those who are brought by their friends try to put a different complexion on the symptoms, assign a different cause and seek a different remedy. They say that a physician can do them no good, that it is not illness but wickedness that has brought them to this state, and that theirs is a case for a clergyman rather than for a medical man. Others will ascribe their mental depression to bodily illness. They have disease in any or every part of their body, are full of hypochondriacal fancies about what they can or cannot eat or about their digestion and bowels. They will tell us that they never sleep, and have not slept for weeks or months; here again we want information from others, and may learn that this depressed individual sleeps fairly well and eats, perhaps, voraciously, but that he is so taken up with anxiety about his health that he has no time or energy to attend to his family or business. Having probably consulted already a host of physicians, he produces a sheaf of prescriptions, has a knowledge of all the drugs in the pharmacopœia, and argument and demonstration are alike powerless to convince him of his delusions. Hypochondriacal patients are extremely numerous and haunt the consulting room of the ordinary physician as much as that of the specialist. They are most difficult to treat and the tale of their sufferings is never-ending and a weariness to the listener.

Of these two classes, patients suffering from simple melancholia and hypochondria, by far the greater number are persons who cannot be called insane in a legal sense or dealt with by being placed as insane in an asylum. Many of them would without doubt suffer if so treated and would derive harm and not good from asylum life and its surroundings. What then are we to advise when consulted by them or their friends? If we examine the individual we find in the majority of cases that there has been loss of appetite, loss of weight, and loss of sleep, the loss of weight depending on the want of sufficient

sleep and on malnutrition, malassimilation of the food taken, or an insufficient quantity of food, the insufficiency depending on defective appetite or hypochondriacal notions about the necessity of abstention or on a mistaken belief that when there is constipation only a small quantity can be digested. Constipation in such persons is very common and is met by them in various ways, some dosing themselves with strong purgative medicines and thereby still further weakening the digestive system, others abstaining from food and so laying the foundation of the common delusion that nothing passes by the bowel, that there is complete obstruction and therefore no food of any kind ought to be taken. The friends also of the patient are apt to look upon the constipation as the cause of the whole trouble and say it is all "liver," and think that purgative medicines are the sovereign remedy.

For one reason or other it is almost always the case that the patient is underfed; often not more than half the quantity of food is taken that is an adequate supply for a man in health, and the wasting from the depressed feeling and diminished sleep soon shows its effect in loss of flesh, a coated "nervous" tongue, and unwholesome tint of face. What is to be done? Almost invariably it is necessary to advise removal from home. The man in business who thinks all is going wrong and that he will not be able to continue it, must go away. The wife who has lost all interest in her house and children must leave them. The objective side of the consciousness of such people is weakened and the subjective rises in proportion. The relation to the environment is dislocated and the latter must be entirely altered. I am not now speaking of the more advanced cases in which delusions are present, but of what is termed simple melancholia in which the malady has not reached the stage of delusion and the patient is capable of a large amount of self-control and able to travel with suitable companions. The choice of these gives rise to much discussion. Wives wish to go with their husbands, and this may sometimes be allowed if the wife is sensible, and if there is another of the party, so that husband and wife shall not be always alone together. Very often it is impossible for the wife to accompany the husband, the object of the change being to separate the two, and rarely is it advisable that the husband shall accompany the wife when the latter is the melancholic. Between two people so closely connected there will be endless discussion of the gloomy thoughts and continual iteration of the same theme. It will be useless to visit foreign towns and picture galleries, to travel amid lovely scenery—mountains and lakes—if the mind is perpetually to dwell upon and give vent to its woes without the restraint of a comparative stranger.

We constantly hear from the relatives that the patient never mentions his troubles to mere acquaintances or even to those more distantly connected. He reserves it all for the wife, the brother, or the sister, and if one of these alone goes away with him, the evil is continued and time and money lost. The best companion for a man is an entire stranger, if possible a physician who can regulate diet, administer medicines, and attend to ailments, real or imaginary. Failing this, the companion should be some one of experience in mental cases who knows what such patients are and has travelled sufficiently to recognize what places and countries are suited to the particular individual. The choice must depend on the tastes of the latter, if he or she has any, and on the time of year. It is of no use to send a man who is fond of the country and field sports to see foreign cities, or one who is studious and literary to wander about in the country, and extremes of heat and cold must be avoided, especially cold. Almost all such patients come to us in an enfeebled condition; from one cause or other, worry or overwork, previous illness, as influenza, or the exhaustion of the depression itself, their strength is reduced and they feel cold greatly; therefore warmth is essential, the regions of frost and snow must be left behind and more temperate climates sought—temperate but not tropical.

The feeding of such people is very important, for few take sufficient food if left to themselves. They complain of want of appetite, constipation, and a foul tongue, and all these may be, and generally are, the result and not the cause of the depressed nervous condition, a condition which must be remedied by nutritive food. What can be done by feeding is well illustrated by the neurasthenic cases treated by the Weir Mitchell system, cases many of which are in a state of starvation with every kind of hypochondriacal fancy. The state of the tongue, for example, which is covered with old, dead epithelium, appeals to the patient and his friends for purgative medicines, and is thought to be an unquestionable sign of dyspepsia. Yet we see this clean, the fœtor of breath vanish, and the constipation give way under a largely augmented diet, which should be ordinary nourishing food, not sick diet or beef tea or the much bepuffed meat juices, most of which are merely stimulants and not foods at all. Constipation at first may be troublesome, the bowels having lost their tone or being clogged by masses of fæces which must be removed by enemata. When this is done, a daily aloetic dinner pill will produce one action which is all that is needed, and as improvement takes place, a pill every other day will suffice till none is required. Should stimulants be given? No doubt we administer less in this country than we did thirty years ago, but a certain amount is often useful and even

needed. Malt liquor suits some if they are accustomed to take it. Many require wine—port wine, Burgundy, or Bordeaux—but spirits are of little use, unless, it may be, to promote sleep on going to bed.

Are we to give medicines to procure sleep? "On no account," say some, "sleep thus induced is of no benefit." I differ wholly from this, and from an experience of forty years and a large number of patients I am confident that many have owed their recovery to sleep procured by drugs which have arrested the downward progress of the malady and saved the patient from an asylum. With regard to the medicines to be given much may be said. Almost every one before he comes to a specialist has been put through a course of the bromides, or has taken one or other of them himself, under the idea that bromide is the sovereign remedy for nervous disorder. Bromide rarely does good in melancholia; an occasional dose may procure quiet if there is much excitement, but a prolonged course, especially of the potassium bromide, will cause emaciation and increase the depression. It is just as useless here as it is useful in acute and sthenic mania. In melancholia I give sedatives for the purpose only of procuring sleep, and for this we now have the choice of a variety. In some cases, especially of elderly persons, opium is most useful, allaying the intense mental distress and restoring sleep. Not every preparation of this drug is of equal value; the salts of morphine often cause sickness and constipation, and the latter is a trouble with which we may have already to contend. Hypodermic injections have disadvantages, and if a patient learns to perform them on himself, he may easily acquire the habit and craving so often met with. The best form of opiate is a watery solution or tincture or the solid opium itself, which may be combined with other medicines as chloral or hyoscyamus. A modern remedy which is often of great service is paraldehyde; it is nauseous and makes the breath smell even on the following day, but given in orange wine, it is administered without difficulty, especially to women, who rather like strong-tasted mixtures. Then there are sulphonal and trional, which are occasionally useful, but all of them may in time lose their effect, and it is a good plan instead of increasing the dose to change the drug and try another of those at our command. As to the time of giving the hypnotic, many require it at bedtime and with it sleep through the night, but there are some who go to sleep as soon as they get into bed, waking in two or three hours and unable to sleep any more. To such we may give the draught on waking, and, if possible, some food with it.

The time of waking from sleep, especially a long sleep, is that at which the greatest gloom and depression is felt, the time when a patient is most likely to do harm to himself and most needs supervision.

Almost all melancholics are worse in the morning and gradually improve through the day, being at their best in the evening. The question of suicide is very important, for there is the possibility of its occurring in every melancholic, and this must be kept in mind when we are advising the removal of a patient from home, or choosing companions or place of residence or travel. Many have committed suicide whose depression has been very slight, who have given no sign of being weary of life, and whose friends are greatly astonished at the act. Now it is clear that if we have to deal with a very suicidal man or woman, we cannot recommend travel in railways or steamships, sojourns in hotels, and walks by mountain and river. Yet we cannot place every one who is suffering from the slight depression which we call simple melancholia in the safe custody of an asylum, and therefore must consider each case and the risk to be run. That there is a risk is beyond question, but it is one which we accept in view of the benefit to be derived from the treatment. In estimating the risk the first thing to be considered is the duration of the depression; if it has lasted for some time and the patient has been stationary, neither better nor worse, and has made no attempt at suicide nor hinted at anything of the kind, we may consider that the risk is not great. But if the symptoms are recent and the advance has been rapid, if the condition is worse than it was a week ago, then such a person ought not to be left alone.

Under no circumstances ought a melancholic to be exposed to great temptation, for there is such a thing as suicidal impulse which may arise in a moment without premeditation. There are many who even in health cannot stand on the edge of a precipice or the ledge of a very high building for fear of the impulse to throw themselves down. Similarly to look down from the deck of a steamship into the miles of blue water beneath may cause the same feeling of impulse even in those who are well able to withstand it, which the melancholic are not. Therefore such obvious sources of danger should be avoided. If a seaside resort is to be chosen, it should be where the walks are not along cliffs, and long sea voyages, a remedy often recommended, should be avoided for the same reason and also because they are monotonous in the extreme. Everything will depend in these cases on the experience, judgment, and tact of the companion who has to select the day's amusement, to order the day's food and the night's medicine according to the requirements of his charge, and a judicious surveillance may be exercised without its being irksome. We are sending the patient away from our own observation and are forced to rely upon the vigilance of those about him. If all goes well and the depression passes away and sleep returns, if flesh is gained

and digestion and appetite improve, there will be a demand that he shall go back to home and business; the wife will want to resume her household duties, to be again with her husband and children. Then difficult questions arise, for if the environment is to be the same, if there is to be the same condition of worry or overwork, there will soon be a renewal of the nervous symptoms, and a second attack will probably be much more tedious and severe. If we can lay our finger on the precise cause of the malady we may be able to suggest a preventive. A man may habitually have denied himself sufficient hours of rest or sleep or have taken an utterly insufficient amount of food. Such matters we can deal with and so lessen the danger; but worry is often beyond our reach. A man may have a nagging wife or a woman a drunken husband; sons and daughters may be constant causes of anxiety, while others have religious doubts and scruples which dull their lives. Patients who have been melancholic a long time should not go back when there is only a slight improvement. Time is required for convalescence, and this should be put to the test by every means that can be devised.

Whether hypochondriasis deserves the name of insanity or not is a question on which eminent authors disagree. It must certainly be looked upon as a mental affection, for when a man in perfect health believes that he is suffering from some grave disease and cannot be convinced of his error, his mental state, so far as his health is concerned, is unsound. Like the simple depression already discussed, it will not be called insanity unless it impels the patient to conduct which renders him dangerous to himself or others, or interferes in some way with his property or business. When this is the case, the sufferer must be placed under care and treatment like any other insane melancholic. It is far more difficult to treat one who is not under restraint whom we can only advise. He has seen many physicians and tried many drugs, but all are useless and only add to the malady. Moral treatment alone is likely to be beneficial, and outdoor exercise is sometimes of great service and may effect a cure; walking or riding on horseback, especially the latter, should be commenced and gradually increased until the limit is reached of which the patient is capable.

Our efforts to arrest the progress of the mental depression may be unsuccessful and the patient advances to the stage of delusions and thinks that he is eternally lost or hopelessly ruined, that his bowels are blocked, or that some loathsome disease has fastened upon him. The suicidal tendency is well marked and there are difficulties about taking food; he has no thought for any but himself, the self or subject consciousness being prominent in all his thoughts and actions.

Here travelling with a companion is impossible and the only question is whether such a patient shall be sent at once to an asylum or be treated in a house taken for the purpose. Either has its advantages, but the latter can only be adopted when finances admit of it; for the house must be of adequate size, light and airy, with grounds in which exercise can be taken without going into public thoroughfares. There must be attendants and some one, medical man or lady, to superintend and act as companion, some one the equal in education of the patient, and for all this considerable means are required; but if they are forthcoming, many are successfully treated in this way and saved from the stigma of being placed in an asylum. This is a great satisfaction to friends and an advantage beyond a doubt to many men and women of position and influence. Where funds are scanty the patient must go to an asylum, for it is hopeless, nay dangerous, to carry out the former plan without a competent staff and suitable premises. Those who go to an asylum have certain compensating advantages. The house is adapted to the purpose and safer than an ordinary house can be, the staff is larger, and the moral force of this is sometimes great. A man or woman may fight and resist when he has to deal with one or two attendants, but if a dozen are solemnly marched into his room, he succumbs and gives up the struggle as too one-sided. An asylum also has this great advantage, the patient becomes a unit among a number of others. In a house taken specially for him, with attendants specially engaged to wait upon him alone, the self-consciousness and egotism which so markedly characterize this form of insanity are fostered rather than uprooted. For there is as much egotism in these melancholic people as in a general paralytic who thinks himself a duke or a Rothschild. There never was a case like theirs; they are the most wicked, the most unhappy, the most persecuted people in the world, the cause of every crime, and about to be tormented with torments greater than ever yet have been devised. All is in the superlative degree, all is consciousness of self and self alone, and may be kept up by the isolation of a special abode or the concentration of the attention of all around on the single individual. But in an asylum the patient is one among many and should be placed with others, for if he is in a room with half a dozen he will get well quicker than if he has his own private apartments and special attendants. The latter is nothing more nor less than a continuance in an asylum of the single-care system and many a patient's recovery is retarded thereby. He should be with others, for the force of example is very potent, and if he sees the rest eating their dinner without hesitation or demur, he will probably eat his; and if he refuses and is told that he will cer-

tainly be fed by force, it will have a good effect, especially if upon persistent refusal the feeding is promptly carried out.

Many recover without asylum treatment when their finances provide them with all that is necessary. Great care must be exercised especially in the matter of suicide. Melancholics in this stage must one and all be looked upon as suicidal, and in an ordinary house with ordinary stairs, windows, and fireplaces the greatest vigilance is necessary. It would be an endless task to enumerate the methods of suicide recorded by writers and commissioners. From them one great lesson may be learned, namely, that a patient should never be left alone. Almost every case is that of a person who has been left or has eluded his or her attendant, or has found the latter sleeping and taken the opportunity of committing the act; but if an attendant is awake and watching, it is not very easy for a patient to hurt himself. Friends are often very silly about this, and tell us that he does not like to be watched, that he does not like a man sleeping in his room. A man asleep in the next room may as well be in the next house, and often he should not sleep but sit up in the bedroom and should be relieved so that there shall be no risk of his going to sleep. One advantage of this is that we have information of the time that the patient sleeps. We are often told "that he has never slept a wink," "has had no sleep for weeks," but an attendant awake can give us accurate information, an attendant asleep knows but little about it.

What has been said already about drugs is applicable to these more advanced melancholics. Paraldehyde, certain preparations of opium with or without chloral, sulphonal, and trional all have their uses and may be tried in turn. Some aperient will be required, something which can be given daily and will act as a laxative rather than a purgative. But medicine may not be efficient without the aid of an enema, for patients will resist the action of the drug and prevent their bowels from acting so long as they are able; an enema is necessary to overcome their resistance, and this is better than giving them very strong purgatives.

The proper feeding of these melancholics is of the greatest consequence. If a patient resists to the uttermost so that he has to be fed by means of a tube, and if he requires many attendants to assist in the process, it will hardly be possible to keep him in a private house; to an asylum he must go where there is a large staff and a medical officer to feed by force. There are many, however, who will not take their food willingly but will allow attendants to feed them. We must inquire carefully as to the amount swallowed, for it is not enough for a man to pick over his dinner and eat here a bit and there a bit and leave half or more on his plate till it is cold and uneatable. This is

what many try to do and then tell us they have taken their dinner and have had quite enough. They may try to take in their attendants in the same way, so when this is the case it is better for those about them to cut up the allowance and feed with a spoon till all is taken. When a patient will not swallow solid food and the attendants feed him with egg and milk or the like, it is not enough for them to pour half of it over him instead of into him and then tell us he has had it. All should be taken or the tube should be resorted to. These persons require a large supply of food, larger, perhaps, than they have ever taken, for many bring themselves to this condition by habitually eating too little and living in a state of semi-starvation, either from fear of dyspepsia or from ideas of its being carnal and wicked to indulge the appetite and eat till one is satisfied. They will protest against the quantity ordered, and vow they have never eaten so much in their lives, which probably is true. We must harden our hearts against their complaints and insist on our orders being carried out with this concession only, that it may be taken in subdivisions. If a quantity cannot be swallowed at one meal, it may be divided into two. The food may be peptonized or some preparation of pepsin may be given with it, but I have found that patients have but little difficulty in digesting even the large additional quantity of food that is given them, for sickness is rare and diarrhœa rarer still. Tonics here will often be needed, and the preparations of iron, strychnine, and arsenic are of great service.

The moral treatment of the melancholic insane is by no means to be neglected, and for this we are dependent to a large extent upon the tact and judgment of those about a patient, whether as companions or attendants. They must remember that delusions are not to be abolished by argument; that the perpetual examination of the patient to see if they are still there, and the constant effort to refute them, are much more likely to fix them deeper and deeper than to eradicate them. Let alone, they by degrees vanish, and the method to be adopted is to distract the mind from them and to substitute other ideas in their place. Some patients wish to bring their fancies forth continually and bore every one around with the never-ceasing recital, but they must be told kindly but firmly to "shut up," that we have heard enough and will listen no more; we must talk of something else, and the invention of another topic of interest is a necessity. Again, it is not useful but harmful to tell these people that they are better. They cannot bear to be so told, even when there is marked and manifest improvement, and they often try to appear not so well and revert to former ideas and habits to prove they are not. Friends and attendants should be warned not to congratulate them on the

amendment, but to go on steadily helping them forward step by step till they gradually return to their former habits of life and press to be allowed to go home and take care of themselves. These patients whenever it is possible should be taken out for drives or walks, that they may see that the world is going on as usual and has not come to an end through their wickedness. In this respect those in private houses have an advantage over such as walk only in asylum grounds.

The very opposite treatment has been recommended by some, the treatment by rest and seclusion in bed with feeding and massage known as the Weir Mitchell system. At a recent meeting of the Medico-Psychological Association this method was brought forward by Dr. J. Batty Tuke, and the opposite, which we may call the open-air treatment, was advocated by Dr. Clouston. The members present strongly supported the latter. It can hardly be supposed that isolation in one room is likely to dispel the gloom of melancholia and the thick-coming fancies that are more likely to be generated than banished by this plan. There is nothing to distract the mind of a man or woman lying in bed with nothing to do but to brood and worry over the past. I have seen slight cases converted into very severe by this mode of treatment.

If treatment fails to arrest the progress of the disorder it may develop in one of two directions. It may become wild, excited delirium, *melancholia agitata*, as it has been called, or *melancholia cum stupore*, the very converse of the other. The patient sinks into profound dejection, and sits or stands all day motionless, vacant and lost, perhaps wet and dirty. He is apparently unconscious of all that is going on around him, yet if we try to move or feed him we find him resisting with all his might. He requires to be dressed and washed by force, to be brought downstairs and led about by force. And although he appears thus lost, yet if a chance is given he will avail himself of it and commit suicide in the most sudden way, and will watch for the opportunity for days or weeks even when apparently in the profoundest stupor. Such people ought not to be left alone for a moment. Their physical condition corresponds to the mental. They are feeble and emaciated, whether young or old. Their vital power is very low and the circulation so weak that hands and feet are livid, and if kept in bed they may easily contract bed-sores, especially if they are unclean. They sleep as little as other melancholics and require narcotics. Needless to say, abundant food must be administered. They will not take any voluntarily and must be fed, resisting more or less; we can therefore select our foods, our stimulants and drugs, and give them without any protest on the part of the patient. With abundant food and warmth we hope to rouse the sufferer

from this extreme state of stupor and bring him first to the condition of an ordinary melancholic and so back to his ordinary health. But this state is one of more profound reduction than that which may be treated in an ordinary house with companions and attendants, and the prognosis is not so favorable. There may be such great weakness and emaciation and such nervous prostration that our food is not assimilated and fails to renew the strength, or the profound brain disturbance may exist long enough to bring about permanent changes in the brain cells, and chronic melancholy or dementia may be the result. The treatment of such can hardly be carried out in a private house, owing to the necessity of having guarded stairs, windows, and fires, and a large staff of attendants.

Still less can the other extreme form of melancholia be treated out of an asylum. The man suffering from that which has been well called acute delirious melancholia does not sit or stand in silent stupor, but in panic-stricken frenzy tears about the room, dashes at the door, windows, or fire, tries to escape from those who he thinks are about to seize or torment him or take him to prison for the sins he has committed. He will not sit in a chair or lie in his bed, but is ever on his feet, thinking that the room is on fire, that he is going to be burned or swallowed up in a lake of fire. He is full of hallucinations of sight and hearing. All his food is poisoned, and he resists with much noise and all his strength those who have to feed him, while a woman in this state will scream till she is exhausted. All such are intensely suicidal and will endeavor in every way to damage themselves. They will resist in order that they may get hurt; will break and swallow crockery or glass, and even gouge out their eyes. The perpetual standing and refusal to wear shoe or stocking may bring about in an enfeebled individual a condition of the feet akin to frostbite, and if this is not observed or guarded against, the loss of a portion of the toes may be the result. A lady I have seen lately was admitted in a very emaciated condition suffering from this restless raving melancholia. Very soon the toes appeared livid and the great toe of the right foot turned black. She was compelled to lie in bed, and warmth by means of poultices, cotton-wool, and the like was applied. She lost the terminal phalanx of the great toe, but all the rest were saved, and she has recovered from the state of acute delirium, though she is still very far removed from sanity.

These patients are for the most part broken in health, feeble, and emaciated, advanced in years, reduced by some wasting disease as diabetes, or starved, owing to hypochondriacal refusal of food. This being the case, no time must be lost, but food must be given plentifully and regularly. We cannot afford to wait to see what coaxing or per-

suasion will do, nor can we be contented with a spoonful or two which may be got down. The patient must be fed three times a day by the tube and the best food for the purpose is egg and milk. By a large tube, even more solid nutriment than this can be given, in the shape of pounded meat mixed with vegetables and soup so as to make a semi-liquid mass which can be forced through a tube. But egg and milk are highly nourishing, and I have fed a patient with these and nothing else for a twelvemonth. These melancholics will wear no clothes, and will strip off and tear to pieces if they can whatever is put on them, so that it is necessary to clothe them in a suit of strong ticking or canvas, which, being laced up the back, they cannot unfasten or tear. Under this may be worn a sufficiency of warm underclothing, and warm, soft boots fastened round the ankle by a strap and padlocked will protect the feet. The constant standing and pacing the room produce great exhaustion, and it may be and often is necessary to fasten such in a bed in a recumbent posture and to keep them lying down. I have known a man thus fastened and rendered motionless drop off in a quiet sleep and have a better night than he had had for many weeks, during which he had been walking about night after night.

As has been said, many of these patients are at the outset of the delirium sinking from exhaustion or some other disease, and a condition comes on allied to scurvy, or gangrene attacks the lung, or the struggling and excitement wear them out, and in spite of all our efforts they die. The prognosis in all such cases is bad, worse than in those of *melancholia cum stupore*, which is not so fatal to life even when reason does not return and the patient remains a chronic melancholic. With the exception of these two extreme forms the prognosis in all melancholia is very good. Almost every case, if it does not run on to these very acute stages, and the majority do not, progresses to a favorable termination in a longer or shorter time, whether in or out of an asylum. Melancholia, simple or subacute, is a curable disorder, and it is grievous to read in the newspapers the tale of those who are allowed to commit suicide by timid or ignorant relatives, when common care and appropriate treatment would have brought about their recovery and restored them to health and happiness. For the recovery of these melancholic persons is not a mere patching up and release of a half-cured mind. It is an absolute recovery, a recovery which may come about after long years of depression. I have already recorded [46] several of these recoveries after long periods. One gentleman who afterwards became an intimate friend was under my care in an asylum for seven years, and then got well and remained well till the end of his life, his death being due to other causes. He was in Paris during the Prussian and the Commune siege, and was none the

worse. No recovery could be more perfect than his, and it lasted for twenty and more years. It is important to bear in mind the possible passing away of what may be looked upon as chronic and hopeless insanity. After a year or two without any change or improvement it may seem to many that legal disposition of property should be made, that the patient's own estate may be dealt with, house or furniture disposed of, and everything arranged upon the supposition that the rest of his days will be passed in the same inactivity and gloom. Nay, wills may be made by relatives in the same belief. I knew one lady who recovered after being away from home in several asylums and in single care for some fifteen years. Her younger children had been brought up to think her dead, and when she got well her return home was very much like a resurrection. Therefore when we are consulted with regard to the affairs of these people, we must bear the above cases in mind. There is no other form of insanity with which I am acquainted where the disorder disappears after so long a period; certainly it does not in chronic mania, monomania, or dementia, and it is evident that during the long periods of depression the brain has received no permanent damage and undergone no organic change. The disorder has been one of defective nerve force, not of hyperactivity or hyperæmia. All has been in defect, a want of action and a want of power. But when the nutrition has again brought the nerve force to its proper level and the cells have again the power to act and react to normal stimuli, the whole machine works as before, its component parts none the worse for the long disuse.

Favorable as our prognosis may be in by far the greater number of cases of melancholia, it is necessary to guard ourselves in one or two directions. For the melancholic symptoms may be replaced by others of an opposite character. It has been said by some that all insanity commences by a stage of depression. This is not the case, for I have known very acute mania come on in a night without the slightest preceding depression. But many patients, whose attack is one of mania or even general paralysis, pass through a preliminary stage of depression, sometimes of considerable duration, before the maniacal symptoms manifest themselves. I have known a man have an attack of melancholia, for which he was placed in an asylum; he was there for some time and then apparently recovered and went back to his business. He had not been at home long before excitement set in, with all the marked symptoms of general paralysis, which ran its usual course. Another man, also under my care, was for a long time in the asylum in a state of depression before the paralytic phenomena were apparent.

There is another variety of insanity which may disappoint our hopes and baffle our prognosis. A patient is depressed and goes through the ordinary course of an attack of melancholia. By degrees he emerges from it and brightens and his friends rejoice. He is busy and active, in excellent spirits, and those who know him tell us they have not seen him so well for years. But as time goes on his high spirits become abnormal excitement, he is restless and cannot attend to anything, and his energy drifts into active mania, and through it he has to be led; this will in time subside and be followed again by the depression, thus constituting a circle and giving rise to what the French call *folie circulaire*. The history of a patient will tell us whether this succession of symptoms has occurred before. If it has, our prognosis must be unfavorable; the melancholia passes away, but is surely followed by the maniacal excitement which may be far harder to deal with.

Who are the people who break down in melancholia? They are the elderly rather than the young. Many are at the time of life which we call the climacteric, men and women who have borne the burden and heat of the day, whose nervous force has been lessened by long-continued worry or sickness. But it is not confined to them. We find it among the young, for hypochondriacal melancholia is not uncommon at the age of puberty in both girls and boys. Malnutrition of the nervous centres occurring in predisposed patients may stop short of the explosive discharges which characterize acute mania and may produce only depression, just as we often find in the young slight epileptiform attacks (*petit mal*) instead of the severe fits of true epilepsy. The melancholia is a slighter reduction than the explosion of mania, is in fact the mildest form of mental disturbance, amounting only to a mental pain, not affecting the conduct and not marked by delusions.

Stupor with Dementia; Acute Dementia.

I have already spoken of a variety of melancholia called *melancholia cum stupore*, the sufferers from which sit lost, silent, and motionless in profound gloom. There is another class which has been confounded with them and has received various names. It was described by Esquirol, and called by him "acute dementia," which name has prevailed till lately. By "acute" is meant a malady which is not chronic, but is a curable disorder lasting a comparatively short time. If we are to abandon this, it may be well to call it *stupor with dementia*, the other being *stupor with melancholia*.

The patients are not people at the climacteric or advanced in

years; they are all young, from fifteen to twenty-five years for the most part. A girl or a boy after a shock or fright, or an exhausting illness like influenza, rapidly falls into a condition when mind appears to be blotted out and becomes a vacant blank. There is not merely derangement or delusion, though for a time the latter may be noticed; the mind is, as it were, obliterated, and the patient pays no attention to those about him or what is said to him, and if he speaks at all, what he says is the speech of an idiot or dement. Such people are not all motionless. One girl used to snap her jaws together for days at a time; she then took to wagging her head from side to side. These actions were purely automatic, for by no effort of will could she have maintained this incessant motion for so long a time. These patients take no notice if we tell them to stop, but if we interrupt them by a pull or a shake, they may cease for a few moments and then begin again. The depth of the mental reduction varies considerably and may extend from mere silly grimacing and chattering to the most profound stupor when by no effort can attention be roused, when the calls of nature are not attended to, and the patient submits to be washed, dressed, and fed, and after recovery there is an absolute unconsciousness of all that has passed.

This extreme stage, however, is not so common as the intermediate where there is apparently the dementia so commonly found in the chronic inmates of an asylum, who sit and do nothing from morning to night, who are dirty if not closely watched, who dribble from the mouth and possibly require to be fed. The recently demented individual will be like one of these; he will stand all day in a position which may be called cataleptoid, but touch him and we see at once that he is not so unconscious as he looks. He will resist with all his might, so that it is a work of great difficulty to dress or undress him or give a bath. Though he be silent all the day and apparently too lost to answer if spoken to, he may screech loudly when he has to be dressed or moved, or cry "murder" and assert that he is being killed. Some will be dirty in their habits, others, on the contrary, will hold their water for four and twenty hours if they can, and will not let the bowels act without the stimulus of an enema.

It has already been stated that these are young patients, boys or girls, whose nervous power being always in defect has been still further weakened by such causes as a shock or fright, or excessive masturbation or previous illness. The great nervous prostration is shown by the physical condition. The circulation in the extremities is so feeble that the hands and feet are blue with cold even in the hottest weather, and in winter there is great difficulty in keeping them warm and free from chilblains or frost-bite. The heart's action is weak,

though the temperature may not fall much below the normal. They do not lose flesh rapidly like the acutely melancholic, neither is sleep absent as in the latter. The reduction may be so profound from excessive shock or fright that this state of things has come on in a short space of time without the long period of depression which melancholic patients go through before they arrive at the stage of stupor. This constitutes a potent aid to our diagnosis when we have to decide upon the nature of the disorder in such people. One marked difference between the melancholic and the young demented patients is that the former are intensely suicidal while the latter are not. This will not be apparent at a glance, but the history and the evidence of attendants will afford information. More difficult is the diagnosis when we have to compare one of the cases of primary dementia with a chronic dement of perhaps the same age. Everything here will depend on the accuracy of the history we receive. The appearances in the two patients may be identical; both may be lost and dirty, idiotic in face, incapable of giving a rational answer or any answer at all. But if we hear that in one this condition has come on recently and rapidly, the result of a shock or fright or some bodily illness, and if the physical condition is also recent we may pronounce favorably as to the termination. If, on the other hand, the dementia is secondary and the outcome of an attack of mania or melancholia, or the result of many epileptic attacks or apoplexy, the diagnosis admits of no doubt and the prognosis will be most unfavorable. We must not be misled by the accounts given us of the duration of the disorder. Friends will keep patients at home without treatment of any kind if they are tolerably manageable, and will let them drift on and on till they arrive at a state of hopeless and incurable dementia. Driven at last to consult our profession, they will minimize the time during which the disorder has been apparent, and because the worst and most extreme symptoms have only existed for perhaps a few weeks, they will give this period as the beginning of the whole to excuse their not having called in assistance earlier, and to extract a more favorable prognosis from us. We must not be deceived by such methods. Only when the case is recent and primary is the sufferer likely to emerge therefrom.

What can be done to cure these young patients and where is the treatment to be carried out? An asylum is not absolutely necessary for they are not suicidal, violent, or noisy. If treatment can be properly enforced in a private house, the patient can remain there and so avoid the additional shock or fright which removal to an asylum may cause. What is most needed is constant personal attention; merged in the crowd of a large pauper asylum, they are very likely

to sink into phthisis. The requisites are warmth, warmth which to some would be excessive, abundant food and stimulus, such stimulus as may come from shower baths or galvanism, and enforced exercise or massage. Stimulants also, as wine or stout, will be required in many cases, and as improvement takes place and the patient wakes up, moral treatment in the shape of change of scene, drives, and walks will be highly beneficial. Tonics also will be required, iron, arsenic, or strychnine, or combinations of all or any of them. Above all care must be taken that these young people do not masturbate. This habit may have played a considerable part in the production of the nervous prostration, and will if indulged effectually prevent recovery. In the extreme state of vacuity it may not be found. The individual is too lost to give way to it, but when the strength increases, he is very likely to return to the habit and it must be prevented; even mechanical contrivances must be used or the hands must be fastened. Menstruation in girls is sure to be absent while they are in this state of prostration, and friends are glad to assign it as the cause of the disorder. It is only a symptom, however, of the general condition, and as this improves so will the catamenia reappear. Then the friends are disappointed if there is not an immediate return of mental health. The two are not dependent the one on the other, but both on the nerve weakness, and the mental improvement may not be simultaneous. It need hardly be said that these young patients are by heredity prone to nervous disturbance, a fact which the friends will try to conceal in every way, and to erect something else as the predisposing cause. And when our prognosis is not borne out by the result in an apparently favorable case properly cared for and treated, the reason is that the hereditary weakness is so pronounced an obstacle that our treatment cannot prevail against it, and the patient sinks into incurable dementia.

Much controversy has arisen with regard to the name which best fits this disorder. Some writers, among them M. Baillarger, have pronounced it to be nothing more or less than *melancholia cum stupore, melancolie avec stupeur*. And they have based this opinion on the fact that on recovery the patient has recollected some gloomy idea or delusion which he had at the beginning of the attack. But such gloomy delusions often occur in the commencement of very acute mania or even general paralysis, and we do not call these disorders melancholia on this account. The old term "acute dementia" is, after all, not inappropriate, meaning by "acute" a primary and recent in contradistinction to a chronic disorder. No doubt cases will be found which do not warrant this or that name. But there are many which cannot be ranked under the head of stupor. A girl in

perpetual motion cannot be said to be in a state of stupor, neither can one who violently and obstinately resists everything that is done for her. Another term is "cataleptoid" insanity, but it is not applicable to many cases. Yet they all appear to be demented, whether they are in a cataleptic and trance-like state or in one of silly chatter and grimace. Primary dementia, to distinguish it from secondary and chronic, seems as good a name as any. The French term *stupidité* is better than stupor, but this is not adequately translated by our word stupidity.

Acute Delirious Mania.

The patients suffering from dementia, whether primary or secondary, may fitly be placed at the end of the scale of insanity. Their nervous force is in extreme defect, the mind is a blank, and the physical condition and circulation closely correspond with the mental. At the other end may be placed those now to be described, patients whose malady is spoken of as sthenic, who are in no way prostrate or depressed but in good bodily health, yet whose nerve centres are in so unstable a condition that some cause, perhaps trifling in itself, destroys the equilibrium, reduces the control of the higher, and allows the lower centres to explode in the most violent delirium. The instability of the nervous centres of such people is the main factor in the history of the disorder. Many are young; they have not encountered the cares and worries of life, neither have they suffered from any wasting disease. They are predisposed and prone to disturbance of the nervous system, and symptoms of mental trouble may come on very rapidly. Such causes as a shock or fright, a violent quarrel, a sudden disappointment or piece of bad news, anything, in short, which produces great and tumultuous feeling, may upset the mind and symptoms of acute delirium may show themselves, perhaps in a few hours. On the other hand, the exciting cause may be physical. The delirium may arise in the course of febrile disease, or during the decline of such maladies as pneumonia, measles, or typhoid fever. It may be the result of fatigue, even such as a long walk. It may follow epilepsy or childbirth, may alternate with rheumatism or gout, or arise after a period of hard drinking.

Its onset, on the other hand, may be more gradual and commence with a certain stage of depression followed by the excitement of mania, this becoming more and more acute till it ends in the delirious condition about to be described. In these individuals the cause is sometimes entirely obscured; the beginning is very gradual, and friends looking back can hardly lay their finger on the exact time

when they first noticed anything wrong, and they are unable to fix the cause, the real factor being in all probability the hereditary taint which renders the nerve centres extremely unstable.

As these attacks frequently come on suddenly without any preliminary symptoms, so may they as quickly subside. In the delirium of alcohol which we call delirium tremens, one good sleep restores the brain equilibrium and the patient recovers; so in some of the attacks following febrile disorders the recovery is nearly as rapid, as it is also in cases in which a physical cause, as fatigue, has existed. If the disorder is likely to be transient there is no need to send the patient off at once to an asylum, and time should be allowed and remedies tried before such a step is taken. The prognosis here is all-important, and various points must be taken into consideration, such as the age, constitution, and previous history of the individual, the duration of the symptoms and probable cause. The patient who, by reason of his unstable equilibrium, is most likely to be upset by a slight cause, may for the same reason easily regain his normal state. Therefore if we hear of a marked family neurosis we need not on this account despair of averting a prolonged attack. There may have been previous seizures of the same character of which we shall be told, and these have been transient. The symptoms may resemble those of hysteria, there being evident consciousness in the midst of the delirium, and an absence of raised temperature and rapid pulse will cause us to give a favorable prognosis and try if the disorder may be brought to a speedy termination.

How is this to be done? The first thing and the most important is to procure sleep. If the patient is allowed to drift on day after day without sleep, a prolonged attack will surely be the result. In the old days opium was the only narcotic, but opium in this form of insanity is likely to do more harm than good and prevent sleep rather than promote it. But there are in the present day many drugs which may be tried; there is chloral which, in combination with bromide of potassium, is probably as good as any. Also, we have sulphonal, trional, tetronal, and paraldehyde. And besides these there is hyoscine, of which more will be said elsewhere. If by means of one of these drugs a good sleep is procured, the delirium may cease and the mind become clear in a short time. Good effects also may follow the administration of a brisk purgative and the attack may be ended by the effect thereof. Sleep, too, will be encouraged by a warm bath,—not a mere plunge into warm water, but a bath of at least half an hour with cold to the head. Sleep will often follow this, and there is also the wet pack; the patient is packed in a sheet wrung out of hot, some say cold, water, which promotes sweating and by restraining all motion

allows sleep to come. For there is no doubt that the depriving the limbs of motion adds materially to the rest of the brain, a fact which the advocates of non-restraint in all and every case entirely ignore.

If sleep comes by means of these methods and is repeated the next night, and the delirium ceases and consciousness returns, we may be confident that the disorder is transient, and that care and quiet will bring it to a happy end. But if our medicines procure less and less sleep, if there is great excitement on waking and less consciousness, and if the delirium becomes wilder, it is evident that the attack is not transitory, and we have to deal with a case which will last not for days but for weeks, and will tax all the resources of nurses and attendants as well as of physicians.

The first question is, where is such a person to be treated? I have treated many of them in their own or in houses taken for the purpose; but here, as in melancholia, it is unwise to adopt this method unless the means and the will of the friends allow of an adequate expenditure for the purpose. If the patient's own house is unsuitable because of the other inmates, or because the noise made by him cannot be tolerated, a suitable house must be taken, and a room specially prepared for his reception, which should be large enough to be airy and cool when three or four people are in it. The windows may be guarded by strong laths nailed across so as not to exclude air and light, allowing them to open, but preventing the patient from dashing himself against the glass, and the sun and light must be excluded when necessary. Scarcely any furniture should be left; a bedstead is not required, for the patient will not lie on it quietly, and attempts to compel him will cover him with bruises; and articles of furniture, as chests of drawers or washstands, he will jump upon or drag about the room, and endless battles will ensue. In short, it should resemble as much as possible the strong room or padded room of an asylum, having the advantage over the latter of being larger and more airy.

In such a room, whether in or out of an asylum, the patient must be nursed through the acute delirious stage, and everything will depend on the skill and care of the attendants to whom we confide the case. In a prolonged attack of this severity mechanical restraint is out of the question; the patient would become exhausted by a continual struggle to get free, and exhaustion and not sleep would be the result. There will be incessant restlessness and motion, incessant chattering, singing, or shouting. Sir J. Crichton Browne has drawn attention[47] to the movements of patients in this delirious mania. Some will run about night and day in a purposeless manner. These he thinks may be suffering from irritation of the posteroparietal lob-

ule of the brain, in which Ferrier has localized the crural movements. Others will toss their arms about incessantly, or busy their hands with the bedclothes. In these the irritation may be concentrated in the ascending frontal and parietal gyri, in which the brachial and manual movements are localized. "Some talk vociferously and jargonize. May we not infer that in them there is an irritative lesion of the orolingual region in the third frontal convolution? Others are resolutely silent, but shake their heads from side to side without intermission. May we not suppose that in them the cortex of the superior temporosphenoidal gyrus is hyperæmic or inflamed?" In the same way Sir J. C. Browne conjectures that hallucinations of hearing, sight, taste, smell, or cutaneous sensibility may be indicative of lesions of the various portions of the cortex which correspond to these senses. Similarly also the higher and inhibiting centres may be not stimulated but paralyzed, and the subordinate or motor centres let loose, so that incessant automatic movements are the result. This seems to account for such movements rather than overstimulation of the lower centres. It is the control of the higher that is wanting, and the lower automatic, freed from this control, continue to act till exhaustion brings them to a close, or the higher recover and regain the mastery. This is well seen in the progress of a case towards recovery. At first there is entire unconsciousness and delirium. Then for a moment or two we are able to arrest the automatic noise and movement, and during this moment the patient may answer a question, greet us by name or gesture, and then at once return to the delirious state. By degrees these intervals of consciousness become longer and there is a greater capacity of attention, and, as the higher centres are strengthened, so do the lower fall under their sway, and the talk and movements are not automatic but the outcome of reason and will.

The talking will be, for the most part, an incoherent jumble of words and sentences, the letting loose of all sorts of partial ideas and confused thoughts and sights from the stores of memory. Odd scraps of poetry, languages long forgotten, places and people which have not been seen for years, are brought out and tacked together in most admired confusion. Definite delusions hardly exist, for the mind and centres of delusion are too obscured for anything so definite, but hallucinations of the senses are not uncommon, and the general emotional state of the patients will vary, some being gay and hilarious, some angry, some panic-stricken, and without actual delusion it is easy to recognize the prevailing emotion in the expression and gestures. Our prognosis will be considerably affected by this emotional condition. Gaiety and hilarity are good signs, anger and suspicion

the reverse, and the terror-stricken panic of some brings them into the class already mentioned of delirious melancholia, of which the prognosis is most unfavorable.

As the automatic action of memory lets loose the string of jumbled names and ideas which we so constantly hear, so does the same automatic condition lay up in a confused and jumbled way that which is going on around, and it is always wise to caution attendants not to say anything before the patient which they do not mean him to hear and remember. A good deal is often remembered, especially of what has happened at the commencement and decline of the attack, but the memory is blurred and untrustworthy, so that we cannot receive all that is told us by a patient as true, and it is often very difficult to come to a decision when accusations are made against those who have had the charge of any one during such an illness.

The physical condition of such people varies very much, women being able to withstand the acute stage better than men. They can go without sleep for a much longer time, and the violence and restless agitation do not produce the same exhaustion or the fatal typhoid condition so often seen in men. The first question of prognosis is whether the patient will live or die, and this will turn upon the amount of sleep, the condition of pulse and tongue, and the temperature. In the old days when opium was the only narcotic, patients often sank and died for want of sleep, and the opium or morphine frequently hastened their death instead of preventing it, but nowadays we have more appropriate remedies, and death from mere want of sleep is rare. The less medicine required the better will be the outlook, and any natural sleep, however short, is a good sign. Some are much more violent than others, will not lie down, but are continually rushing about and struggling with those in charge of them. In this way they take much out of themselves and soon become exhausted. If we can see the tongue we may gain valuable information; if it remains moist and comparatively clean, as it often does even amidst great excitement, the prognosis will be favorable; but if it becomes dry and brown, and the lips and teeth are covered with sordes, the gravest opinion must be given; this brown and dry condition of tongue in former days was, I am convinced, frequently brought about by the injudicious administration of morphine. The temperature does not rise to fever heat, though it will rise somewhat. Bevan Lewis says it is always raised more or less, sometimes to 102° F., but I recently have seen a young lady in very acute delirium where it was slightly subnormal. There are various minor points to be observed. If the reduction is so great that everything is passed involuntarily, it is a bad though not a fatal sign, and the ease or the

difficulty with which a patient is fed must enter largely into the judgment which we form as to his future. The pulse too must be taken into consideration. Like the temperature, it is often not greatly raised in frequency, even when there is much excitement and great muscular exertion. But a rapid pulse is a bad symptom, especially if it continues while the patient is comparatively quiet; for the violence and outbursts of noise and movement in these cases are generally paroxysmal and not continuous. After a period of unrest there comes one of rest, and if in this the pulse falls to some point not much beyond the normal, the prognosis is good; if it remains rapid and the temperature also is high, which it probably will be, the termination is likely to be fatal.

The urine of such persons will be scanty, high-colored, and offensive, unlike that of patients suffering from hysterical mania, which is copious and pale. The bowels will not act without aperients or enemata, and the motions are generally dark and offensive. There is also in many cases an overpowering odor from the skin, especially in women. Appetite is wanting; some will refuse their food strenuously, but, unlike those suffering from acute melancholia, the majority will allow themselves to be fed; many suffer greatly from thirst, especially in hot weather, and will drink with avidity, and much food may be got down in the shape of drinks.

Whether we have the patient in an asylum or in a room prepared for him in a private house, the treatment must be the same. We have to prevent him sinking from exhaustion produced by this most acute disease, for there is nothing fatal in the disease itself; hundreds recover from it, some many times. It is exhaustion that kills, the patient's strength not being able to meet the tremendous demand which is made upon his nerve force, for the renewal of which his sleep and nourishment prove insufficient.

Everything, therefore, turns upon his obtaining sleep and food to repair the waste. We cannot hope in this stage to procure a long night's sleep by drugs unless we give something so potent as to cause great risk. But short sleeps are enough to save life in the majority of cases, and various medicines may be given for this end. That in which I have the greatest faith is a combination of chloral and bromide of potassium. The latter is of no use by itself and only depresses without procuring sleep; the action of the former, however, is promoted by the combination which is more useful in such attacks than sulphonal, trional, or paraldehyde. By it we may procure sleep of one, two, or more hours' duration, which is all-important. It should not be given frequently; one or two doses in the twenty-four hours are sufficient, and it is useless to give less than thirty grains of

each. If this dose loses its effect, and sleep becomes shorter and not longer, it is a good plan to change the medicine rather than increase the dose; a new medicine often has a beneficial effect, or we may stop all medicines and see whether sleep will come without them. Another drug which is sometimes used in these attacks is hyoscine, which is preferable to its earlier congener, hyoscyamine. Hyoscine is a very powerful remedy and requires great caution and watching. Those who have most experience speak of its danger, and even gr. $\frac{1}{200}$ has caused death. It is usually given hypodermically, the dose being from gr. $\frac{1}{200}$ to gr. $\frac{1}{100}$ increased to gr. $\frac{1}{75}$ or gr. $\frac{1}{50}$. Given by the mouth it appears to have little effect. It may be administered in asylums to patients who are strong and not in any way exhausted, where there are resident medical officers to watch the result, but I should not like to give an injection to a private patient and leave him or her to attendants only. The recollection of many hours spent in performing artificial respiration on a lady who had received an injection from a medical friend is still very vivid in my mind. After the height of the attack has passed and we cease to be anxious about life, I find often that it is a good plan to stop all sedatives and narcotics and let natural sleep come, even if it be scanty. There is a stage when a good night's rest procured by drugs seems to set the patient up and perpetuate the mania and delusions day after day. A less amount of natural sleep does far more to clear the mind.

Almost as essential is the feeding of such people. They do not as a rule refuse food; few require feeding by the tube, and good attendants will take advantage of the intervals of quiet which occur in most cases, and will get down a considerable quantity of food, semi-solid or liquid. I care little for beef tea, which not unfrequently causes diarrhœa, and still less for any of the meat essences or juices so largely advertised. Milk and eggs are the two most nourishing things that can be taken—two eggs, yolk and white, to each half-pint of milk, and as many of these half-pints a day as can be got down. Chopped or pounded meat and vegetables, or the juice of vegetables, are useful when we can get them taken in addition to the milk; and also cooling drinks, as lemonade or orangeade, if there is great thirst in hot weather. Unless there is great prostration, brandy and wine are not required. They excite and dry the mouth, and, if given at all, should be well diluted. Needless to say there is enormous waste in this disease and patients lose flesh rapidly, but this will soon be repaired when convalescence commences, and the abstraction of a quantity of fat is an immense relief to the heart.

Besides food and sleep rest is essential to these persons. They should not be allowed to stand all day and exhaust themselves any

more than the acutely melancholic. On the other hand, continuous mechanical restraint in the form of fastening them on a bed is equally out of the question, though one often meets with it in patients kept at home in improper rooms. Skilful attendants will prevail upon a patient to lie down for a portion of the time on the bedding or mattresses prepared on the floor, and such recumbent posture in a darkened room may very likely induce sleep. Such people will tear off any ordinary clothes, but if a strong suit, jacket and trousers or petticoat, made in one piece and laced up the back, be procured, any quantity of body linen may be placed under it; or a strong blanket may be fastened round the neck and shoulders to form a kind of poncho. If this is fastened round the upper arms they will not be so available for mischief, and yet there will be no irksome restraint, and by it they can easily be held without the infliction of any bruises. When quiet and recumbent, cold applications to the head are often very grateful in this delirium, and may cause the patient to fall asleep. And there is another remedy largely used in France, namely, the continuous hot bath. This has been used in that country for ten, fifteen, or eighteen hours at a time, but is not without danger. Dr. Clouston mentions a man who died in the bath while he was sitting beside him, after being less than an hour in water at 103° F. He had not detected any heart disease, but one must bear in mind that in all these cases of acute delirium there is a great strain upon the heart, and it may become weakened during the course of the disorder. In patients who have had repeated attacks we almost invariably find the heart dilated and the right side thinned. But a warm bath at a temperature of 92° or 93° F., with cold to the head, for half an hour is often most efficacious if it can be administered without fighting or struggling. Much will be absorbed by the skin, the fever and thirst will be allayed, and that which is lost by the profuse perspiration will be replaced.

The prognosis of this formidable disease is not in my experience unfavorable if suitable treatment is adopted. A patient strapped down to a bed in a hot room, and fed by ordinary sick-nurses wholly inexperienced, will probably die, and many are kept like this for a long time and at last sent to an asylum in such a state of exhaustion that proper treatment comes too late. In the first attack all ought to recover, unless they are enfeebled by previous disease or some other cause. There is more anxiety about men than women; they do not stand the strain so well, are more violent, resist interference more strenuously. The termination is almost invariably recovery or death; sometimes after the long delirious struggle the patient becomes quiet, but it is the quiet of coma, not of sleep; the circulation in the brain

becomes impeded by the products of waste which cannot be carried off, and effusion and coma follow. But fortunately this is not the usual termination. Sleep comes either from our drugs or naturally, the waste ceases and the waste products are carried off, the crisis passes, and the mind in time clears. For this a short period may be sufficient, and a patient after a most acute attack may leave the asylum in a month "recovered." On the other hand a much longer time of convalescence may be required. After the delirium there is often a long stage of dementia from which the sufferer slowly emerges, if his nerve force is equal to the recuperative effort. Some do not, and remain permanently in a state of chronic mania or chronic dementia; these are the weakly, or patients who have had repeated attacks; from the early ones they recover, but as time goes on and age increases, there comes one from which they do not emerge, but either die or sink into a condition of chronic insanity.

This disease can hardly be mistaken for another, though there are many in which violent delirium occurs. There is the delirium of alcohol, commonly known as delirium tremens, which is in truth a delirious mania, and, if very acute, may simulate in many respects that which has just been described. The history here is important, but we may not always be able to obtain it if a patient is taken ill at an hotel or away from friends. There are points of difference, though they may not be constant. Hallucinations of sight are among the commonest symptoms of alcoholic delirium, the patients are said to "see snakes," and they do this constantly, together with rats and such things crawling on the bed, but these are rare in delirious mania. Hallucinations of hearing, too, are more common in the former than in the latter, though not so frequently met with as those of sight. And the muscular tremor which has given its name to the disorder is not found in delirious mania. This is quite peculiar, and is due not to the delirium, but to the alcoholic poisoning, and may be noticed in drinkers who have no delirium. I have seen a gentleman perfectly sane whose servant had to hold the brandy and soda to his mouth because his trembling hands could not raise it. Knowing that delirium tremens runs a short course, and that patients generally recover or die in a week, we do not remove them to an asylum. The delirium which arises in the course or decline of febrile disorders, as measles or pneumonia, is generally transitory and rarely becomes a prolonged and severe attack. Very severe delirium occurs in the course of fevers such as typhoid, with delusions and violence equal to that of delirious mania, but the history and onset of the illness ought to leave no doubt as to the diagnosis, even if we had not the thermometer to aid us. Such patients do not struggle to get out of

bed; fever-stricken, they have not the strength of the maniac. We may meet with delirium in those who are suffering from acute disease of the brain, as meningitis, or it may come on after a succession of epileptic attacks, but in neither of these can the diagnosis be doubtful.

The naked-eye appearances after death are less than might have been expected in a disorder so acute and so rapidly fatal, yet the tale they tell is one of violent overaction, and is what we should expect from the symptoms. There is engorgement of the sinuses and veins, congestion of the pia mater, opalescence of the arachnoid, even effusions of blood from the rupture of small vessels between the membranes. "The cells soon get granular; there is a proliferation of the nuclei of the neuroglia, the lymphatic spaces and perivascular canals soon get overdilated and blocked up with débris, and an enormous number of microscopic capillary extravasations take place in and around the convolutions in bad cases."[48] The result of all this blocking is the serous effusion so often seen ending in coma and death.

Mania.

The condition known as mania is included by some eminent authorities among the states of mental exaltation (Bevan Lewis, Clouston). Others, as Maudsley, call it insanity with excitement. Excitement is a vague term; there is excitement in melancholia as well as in mania; neither does every case of mania display exaltation. Anger, suspicion, and hatred are developed in some without any of the joyous hilarity or grandiose ideas which characterize others. It has been said with truth that almost every case of mania commences with a stage of depression. The morbid process of reduction here is not great. The patient, though depressed, can talk rationally about things which do not concern himself, can even transact his business in a fashion and behave himself decently before all men.

But if his disease advances, not in the direction of melancholia but of mania, what do we find? His highest brain centres, the seat of the highest intellectual operations, are enfeebled, and continuous or concentrated thought is impossible; though there may be no actual delusion, he rambles in conversation and ideas; we cannot keep him to the subject or get a plain answer to any question. Not only are his higher centres incapable of steady and continuous exertion, they are equally unable to control the lower centres, which, raised into activity by the loosened subject-consciousness, show an entire change of feeling resulting in extravagances of the whole conduct of the individual. If we could look at the brain at work and note

the action of the cells and fibres, we should no doubt discover that the mischief is in the highest centres, and that their defective action and loss of control give rise to the change in the feeling and conduct and to the almost automatic action of the lower. Although there may be overaction and hyperæmia in the latter, the very reverse may be going on in the higher. This is shown by the deterioration not uncommonly seen in old people. The higher intellectual portion of the mind is weakened by age, but this weakness is not manifested by failing memory or childishness. This stage is not yet reached, yet we find a change in the conduct and moral sense, and a man who has hitherto borne the most blameless reputation sinks into licentious profligacy or sottishness. In the young this weakening is brought about not by age but brain disorder, and gradually is evolved the spectacle of a change in habits, disposition, and conduct which bewilders the friends and is of a character which can perhaps be hardly called insanity in the early period of its incidence. Nothing is so common as to hear of a total change in the feelings and conduct. The patient talks volubly, much more so than usual, rambles from subject to subject, acts or talks in an improper manner, and justifies all he says or does. There may be no actual delusion, unless this justification of insane acts and inability to see that there is anything wrong in them can be called one. Here is most clearly manifested that want of adjustment between the individual and his surroundings which has been considered to be the essential characteristic of insanity. The environment remains the same, but the change is in the patient. This he cannot see, and he falls out with all around him and accuses them of the change, or indulges in insane and extravagant conduct and quarrels with those who remonstrate.

The contrast between this stage of mania and the early stage of melancholia is great. The melancholic man is depressed, anxious, and gloomy about himself and his prospects, but apart from himself his mind is clear and memory sound, and he can give us a clear and rational judgment on a point not connected with himself. The maniacal patient cannot collect his thoughts or fix his attention. His ideas flow with great rapidity and equal confusion, and delusions, if they arise, vanish and are replaced by others which reflect the humor and temper of the moment.

The treatment of these people is often a matter of great difficulty and requires much care and caution. If there has been a prior stage of depression, the appearance of pleasurable emotions and joyous hilarity will be hailed with delight by the friends as the passing away of the cloud. But by degrees the hilarity becomes insane excitement, bringing with it insane conduct. It is evident that some control is

necessary, and the question arises, how is this to be applied? Such patients are not docile and tractable as are so many of the melancholics, who require to be watched and fed, but wish to do nothing save commit suicide. These are ever in movement, active and restless, incessantly talking in the most egotistic manner, reckless in expenditure, and prone to indulge in drink, of which a comparatively moderate amount may produce a great aggravation of the symptoms. To get such patients away from home is the first thought, and it should be done if the requisite means are forthcoming. They must be where extended exercise in the open air is possible, and there must be attendants or companions, not less than two, who can carry this out. They should not be cooped up in a vessel for the sake of a voyage, or kept in a town to walk in busy streets. The country or the hills and mountains are the place for them, and the change of scene and separation from the former environment with prolonged exercise will in favorable cases work a cure. Plenty of food is required and little stimulant. Sleep will be defective, but although an occasional dose of chloral and bromide or sulphonal may be given, there is not much good to be so derived, and it is better to trust to the exercise and fatigue produced by walking rather than to drugs. In the case of women there will be the same need of exercise and change, but the walks need not be so long, or so remote from towns, if the patient's demeanor is orderly and does not attract attention.

Such treatment may not be possible on account of the want of funds, or the disorder may advance rapidly, and instead of talkative excitement and changed conduct and feelings, a truly maniacal reduction may rapidly supervene, and we have to deal with an acute mania which is very difficult to treat anywhere except in an asylum. This is not acute delirious mania, for there is no delirium; these people are perfectly conscious of what they are about, are mischievous, wet, and dirty, in order to give as much trouble as they can; they will do everything they can to irritate and provoke the attendants, and will then complain and invent ingenious lies concerning them. They are abusive, filthy in language and acts, and will destroy clothes, bedding, or furniture.

The insanity of some is shown in outrageous conduct and language, others have numerous delusions and hallucinations which frequently change and vary much in character. Many can talk coherently for a short time, then ramble off and get excited, and sing, shout, or make rhymes. Their language is often very obscene, and both sexes will practise self-abuse in the most open and shameless way.

There is not the same anxiety about the bodily health in these

cases that there is in acute delirious mania, where a patient may die of exhaustion in a week. They seldom die in the attack, unless the strength is impaired at the outset by some other disease, or unless it is gradually worn out by the long duration of the malady. Sleep is not entirely absent, even if we give no medicines, and more can be procured by them. The tongue will often keep quite clean in spite of the incessant chatter and singing. The pulse will not be quick when the patient is quiet and there will be no rise of temperature. There is no difficulty with the food, which often is eaten ravenously; it may be messed and thrown about, but will not be refused for any length of time. If a patient does not take it to-day, we can afford to let him wait till he is hungry, feeling confident that to-morrow he will take as much as we will give him.

These persons are too noisy and destructive for any private house. They are not sick patients to be kept in one room and nursed, but beyond all others they require the grounds of an asylum where they can be walked about by attendants and kept out of doors for a good portion of the day. To give them a sufficient amount of exercise anywhere else is impossible. Their habits may require them to wear an asylum dress, which they cannot remove or destroy, and their language and demeanor would make it impossible to take them abroad on the most unfrequented moor or mountain. Yet exercise they must have, and with this they will sleep, and sleep thus procured is far more valuable than that which follows drugs. Friends who object to asylums try to keep such at home, probably at the top of a house, not unfrequently fastened on a bed to prevent them rushing to the door or window. I saw a young lady lately who had been so fastened down for a month. She recovered in a few months in an asylum, but her recovery would have been more rapid had she been removed thither at first. Patients kept at home in this way are sure to be vigorously dosed with drugs. The friends attach the greatest importance to the amount of sleep procured, and all the medicines in the pharmacopœia are tried often with little result.

Are narcotics ever to be given? In some cases they do good in occasional doses, preventing the waste of tissue and procuring some sleep and rest. Frequently a dose given every other night or every third night is sufficient. The effect appears to be prolonged over more than one night; with sulphonal, in fact, there is often more sleep on the second than on the first. But I have observed that at a certain stage drugs given every night, even if they produce five or six hours' sleep, prolong the malady and do not cure it. The patient is refreshed by the sleep, but the mind does not clear and the confusion and incoherence remain unchanged. If the bodily health is fairly

good and we are not anxious about life, it is a good plan to stop all sleeping medicine and let the patient get what sleep he can without it, when mental improvement often follows. More strongly still is to be deprecated the practice of dosing such patients with enormous quantities of the bromides, not to make them sleep but merely to quiet and make them more easy to manage. To prolong this treatment for perhaps weeks at a time is to reduce the strength, to cause great emaciation, and to unfit the sufferer to weather the storm. Moral treatment is not to be overlooked, and this can be applied far more efficiently in an asylum. The patient is to be encouraged to be of good behavior. He will always be wanting or asking for something, but his obtaining it will depend on how he behaves. Complaints that he makes against attendants can be investigated on the spot, and if he accuses them of striking him, the mark can be looked for. But the care of such people in a private house, without any responsible head, is attended with the greatest difficulty. Mechanical restraint is not only of no use but will do harm, increasing the excitement and provoking a constant struggle; it may be useful sometimes to place a pair of locked gloves on the hands to break through the habit of destroying clothes, but these merely prevent the free use of the fingers and do not confine the muscles of the body or incite resistance.

What is the prognosis? In acute delirious mania the question is, will the patient live or die? if he lives, he will almost certainly recover. Here it is not so much the question of life as of recovery. These people are for the most part young and in fair bodily health, and in a first attack they almost all get well. The points to be considered are, first, the length of the illness. Has it lasted a long time, upwards of a year without improvement, and is it therefore likely to become chronic? Patients sometimes get well even after a longer period, but after a year in most cases the outlook is not encouraging. Secondly, are there any unfavorable symptoms, such as hallucinations of hearing? If a patient loses the very acute maniacal state, but continues to hear "voices," and is violent on account of what these voices say, the prognosis is bad. So, too, the character of the delusions may tell us something; if they are of an absurd nature and constantly changing, we may have hope, but fixed ideas, such as the delusion of conspiracy and persecution, are hard to eradicate. Previous attacks must be inquired into. A patient may recover two, three, or four times, and then have one which is more severe and prolonged from which he may not emerge; but the fewer there have been, the better the prognosis. We must find out if the maniacal excitement has followed a long period of depression, which in its turn followed a

stage of excitement, the case being one of alternating insanity, the *folie circulaire* of the French. If this has happened before, it probably will again. The mania will pass off to be succeeded by melancholia, there being possibly an interval between the two in which the individual may appear to be perfectly well.

How is the prognosis affected by the knowledge that the insanity is hereditary? In young persons acute mania is almost always the outcome of inherited constitutional instability, and grave fears are entertained on this account. We do not find, however, that this prevents recovery in the early attacks. They recover, break down, and recover again, but in later life this inherited taint may stand in the way, and the patient may sink into chronic mania or even dementia, to remove which our efforts avail not.

Recurrent Insanity.

At the close of an attack of insanity, whether mania or melancholia, we are sure to be asked if it is probable that the patient will have another, and if so, at what date. Unfortunately our answer will be that it is probable, the probability depending very much on the inherited tendency and on the origin of the first attack, which may or may not have been acquired. The nervous centres of the brain which have once been reduced to the condition of instability that connotes insanity do not thereby acquire an immunity from subsequent reductions, but on the contrary are more and more sensitive and liable to lose their equilibrium from various causes. The return of the disorder, however, may be long delayed. The patient may pass from youth to age, to the time of the climacteric or later, before any mental disturbance shows itself. This return after so long a period, due perhaps to a special and sufficient cause, is not what is meant by recurrent insanity. In the latter there is a periodicity, and that there should be a periodicity in this disorder is not surprising, for all nervous disease is periodical. Epilepsy is especially so; we cannot tell why the fits recur except that the time is come when they must recur. Neuralgia, migraine, neurotic gout, epileptiform tic, all recur with more or less regularity. Some cause is assigned often without reason, and when the disease departs, some remedy equally without reason gains the credit of a cure, but the recurrence takes place with the same regularity. In every asylum we find patients or habitués in whom the recurrence is a marked feature. Some recover and rejoin their friends, and an interval of two or three years may pass before they again break down, an interval of perfect sanity or one clouded with the alternate state, excitement following depression, or a depressed

feeling coming after an attack of mania, yet neither necessitating special care and treatment.

I have known patients, men and women, who went through a long life in these recurring illnesses. One at present under care is eighty-five, and her insanity began with epileptic fits when she was in the adolescent period. Yet fits have not been a feature for many years; now and then, perhaps once in four or five years, one may occur, but it is not an epileptic case. In the two longest cases I have known the first attack happened in adolescence, but Bevan Lewis says that "these recurrent forms are far more prevalent in adult life, and increase gradually towards the decline of manhood and womanhood. In men quite one-half the cases of recurrent insanity occur after forty years of age, and out of a total of sixty-six individuals so affected, forty-nine had passed their thirtieth year of life; similarly in women, we find that nearly half the cases cover the period of life between forty and fifty-five, which may be safely taken as the limit of the climacteric period. In fact the period of life between forty and sixty years in the female is peculiarly susceptible to this form of mental derangement, being the period involved in sexual decadence and the advance of senility." [49]

In my own experience I have found the first attack occurring at an earlier age than forty, both in men and women. The intervals in the commencement of the disorder were long, and threatened returns were warded off by treatment, but as time went on the intervals became shorter and treatment availed nothing, the insanity becoming more marked and each attack running a longer course. After a series of recurrences with short intervals and symptoms of great severity, recovery does not take place. The mind gives way before the constantly repeated strain, and organized changes take place in the brain centres. Instead of rejoining his family or friends after each so-called recovery, the patient remains a permanent inmate of the asylum. Yet even in the demented state the periodical attack of mania will recur with the utmost regularity, and every feature of the preceding illnesses will be reproduced. The period of the return may vary greatly; some I have known who were melancholic or maniacal with the greatest regularity on alternate days, and in an ordinary attack of insanity it is not unusual to find a patient alternating and having "good" days and "bad" days with considerable exactness. Wherever there is regular recurrence, whether of the same kind of attack or of the circular or alternating form, the prognosis is most unfavorable. It may be assumed that in all, especially in those who begin young, there is a strong inherited tendency to neurotic disease. This, says Bevan Lewis, is more often atavic than direct, its frequent

appearance in the collateral line of uncles and aunts being strong presumptive evidence in favor of an atavism, even where no other record exists. In these predisposed persons various causes may light up the mischief. Masturbation, gestation, or parturition, or alcoholic indulgence may be the origin, but subsequent attacks may have much slighter or even no assignable causes, the unstable nervous system losing its equilibrium almost by the lapse of time.

Can anything be done to stop the recurrence of these attacks of insanity or the alternating cycle of melancholia and mania? There is plenty of opportunity for making a trial, as we may have a long life during which to experiment. Yet I am not aware of any treatment which can be relied upon. Certain obvious causes must be avoided, especially alcoholic excess. Persons who have been insane, and are consequently unstable, are affected by a small quantity of drink, as also are those who have received blows on the head, and the latter is not unfrequently the exciting cause of this recurrent insanity. I have found change of scene postpone the return but not prevent it. The innate and constitutional vice is not to be overcome by mere change of environment or rest from work. In spite of all we can do, the seizures recur often with great and dangerous violence, the patients having numerous delusions, hallucinations, and morbid impulses, which are reproduced on each occasion with wonderful uniformity.

Monomania.

There are various patients, in and out of asylums, who are not greatly depressed, nor violent or excited. At first sight and in ordinary conversation they may pass as sane people, and they form the class which has been termed by lawyers the *partially insane*. Their minds, however, are not sound. On some point or other of idea or conduct insanity is manifested, if we have the opportunity of discovering it, and according to the nature of the defect and the resulting conduct it may be necessary to confine the individual in an asylum, or possibly to give him a considerable amount of liberty in an ordinary house. These partially insane folks arrive at the point of delusion in one of two ways. Of an insane temperament, prone by constitutional inheritance to be suspicious, or jealous, egotistic, and selfish, or nervously timid, they advance to a delusion which has grown out of one or other of these idiosyncrasies. This, which is a primary monomania, has received from some the name of paranoia, a word which in its origin conveys no special meaning, for it only means derangement of mind, and is calculated to throw not light but obscurity on the nomenclature of mental disorder. The cases in which

delusion is arrived at as a primary symptom, and which stop there without other symptoms of insanity, are comparatively few. Far more common are those in which the monomania is secondary, having followed an attack of mania or melancholia, in which the flood of fancies and surging ideas has crystallized into one spot which remains fixed and immovable for a long period, perhaps forever. The acute symptoms have long ceased, the cause is forgotten, the deep depression has passed from the melancholic, and the exaltation or hilarity and swagger from the maniac, but there remains in each a fixed belief, of the falsity of which he cannot be persuaded either by his own knowledge and experience, by the evidence of his own senses, or the demonstrations and declarations of others. He may be able to lead the life of an ordinary sane man if his delusion does not render him greatly out of harmony with his environment. But it may render him dangerous to himself or others, and then it will be necessary to place him under care and treatment.

It may be well to examine some of these varieties of monomania. They are not difficult to find, for every asylum will furnish such patients, who are to be found also dwelling in private families and leading a harmless though eccentric life. They may be divided into five or six classes, though no two patients are exactly alike, and endless subdivisions may be made. The mind here is not obliterated, neither is it in a state of general confusion of ideas and inability to reason and think. Given their premise, these people can argue keenly enough, but that their premise is false they cannot see. There is a twist or kink in the mind, an aberration, not an abolition. Bevan Lewis places these monomanias among states of mental enfeeblement. Maudsley calls them insane deformities of mind, and speaks of them as the counterpart of a fixed spasm or deformity of movement.

Many grow out of the constitutional peculiarity of the individual, and we are often told that his insanity is an exaggeration of his normal self. This will readily appear if we analyze some of the monomanias most commonly met with.

Monomania of Pride.

There are many in whom the subject-consciousness, of which I have spoken, rises to a considerable height even in the healthy and normal state, and the egotistic feelings predominate over the altruistic. This we see displayed in the character and bearing of the individual, in his relation towards his wife, his family, and friends, and his demeanor in the social circle in which he moves. This one is proud of his learning and intellectual attainments; another imagines

that he has achieved a position in society which is quite unique; a woman is vain of her personal appearance, and overdresses herself and paints her face and tires her head to attract admirers, and, as time goes on, she redoubles her efforts to tempt the tardy wooer. Some have ambition strongly developed and are ever seeking to rise above their present sphere. Insanity comes upon them, and if their physical condition is not one which dashes them down into the gloom of melancholia, then in all probability the egotistic feelings will be largely increased and all the former exaltation will be exaggerated.

In the acute stage of mania there may be great exaltation due to the morbid brain excitement, as we see exemplified in the grandiose ideas of the general paralytic, who before his illness may not have been specially egotistic. But when the acute stage has passed, instead of perfect recovery there is left this remnant of disease tinctured by the prevailing characteristic of the individual mind. Of this class are the delusions of those who think themselves great and titled personages. They may lead a quiet, uneventful, and routine existence in an asylum, taking the same walk and following the same occupations day after day, and yet all the time will assert that they are dukes, duchesses, or the like, and may not even complain of their detention. I knew an old lady who was for years under my care. She fancied herself the duchess of R——, and that I was the duke, her husband. She used to follow the movements of this nobleman as narrated in the newspapers, and ask me all about them the following day, contending that I had been here or there as the case might be. And then she would consult me about her health or ask for a pill as if we were patient and physician. She was in no degree demented, and remained in the same condition till she died. I knew her before her illness, and she was then an exalted and egotistic person and very vain.

Another form which this self-feeling may take and develop is religious fanaticism. As the melancholic man thinks himself the most wicked man in the world, one who has sinned against the Holy Ghost, and of all that have ever lived the worst, the egotism coming out even here, so the religious maniac thinks that he has a divine mission, that he is to convert the world, that he is the chosen of God or the Saviour of the world himself. There have been many fanatics of this sort who have found followers and have drawn crowds after them in all countries and ages. Such will be found in every asylum, rational in other respects and well behaved. If they learn what it is that detains them in the asylum, and conceal their delusion, or assert that they have given up the idea, it may be very hard to say whether they are still insane or not. A case of this kind came under my notice some few years ago. A young man of thirty was admitted in an

acute state of insanity, asserting that he was the Saviour and that all he did was by command of God. He persisted in this for upwards of six months, and then apparently recovered, renounced all his fancies, and stated that he now believed nothing of the kind. He was released and went abroad, and the same year published a book in which he showed that he had lost none of his delusions. It stated on the title-page that it was written by "the Christ." This patient, however, was more fortunate than the majority of monomaniacs, for after another year he recovered, and wrote begging that his silly book might be destroyed.

Another man who was under my observation for many years, and grew old in the private family in which he had long resided, was under the delusion that he was to be the Messiah at the second coming, and used to ransack the Bible for texts to support his belief. He had taken the highest classical honors at Oxford, and was a Hebrew scholar and a man of intellect and ability. He went where he liked unattended, and behaved himself with propriety, though latterly he became somewhat more eccentric. His delusion remained to the last, proof against all reasoning. Religious beliefs cannot be disproved by demonstration. Every one thinks that he is justified by the faith that is in him, and points to the beliefs of others which are equally incapable of exact proof. Probably this form of monomania when it becomes chronic is the most incurable of any, being an exaggeration and development of the constitutional idiosyncrasy of the patient. Religious ideas, however, crop up in the course of many acute forms of insanity, both mania and melancholia, and pass away again like other delusions, so that the popular notion that they mark a very incurable form of the disorder is erroneous.

Another monomania springing from the same source of egotism and conceit is the fancying that people are in love with the person thus exalted. This is something quite distinct from the erotomania so often seen in acute and puerperal mania, marked by indecent talk and gesture and improper advances to all of the other sex. The egotistic man or woman, puffed up by ideas of being personally most attractive, singles out some one and straightway imagines that the latter is in love with him or her. This is often not a secondary but a primary monomania, one which does not succeed but precedes other acute symptoms, and is not the residuum of an attack of mania. Women are more subject to this fancy than men, as might be expected. Old maids who are beginning to despair of ever being wed, and whose thoughts continually run on the subject, conceive a desire for some man or other who comes before them, in a vast number of instances the curate of the parish or the vicar, should he be unmarried. They

are certain that he is in love with them, and pester him with letters and presents, waylay him in his walks, and seek private conferences with him in the vestry. This may go on till it becomes a nuisance and complaint is made. It may not be a clergyman, but rather some friend or cousin with whom they are on terms of close acquaintance or even intimacy. Forthwith all that has passed in neighborly greetings and meetings is said to have a meaning. Letters written in cousinly phrase are hoarded and produced as being those of a lover, and if he is not careful a man may be easily entangled by such demonstrations. Conversely men may imagine that public characters, singers, or actresses are in love with them, and may follow and persecute them with presents and annoy in many ways if not put under restraint.

Monomania of Jealousy.

Somewhat akin to this, though growing out of another idiosyncrasy, is the monomania of jealousy. Some people are jealous throughout life; their intense egotism brings this about at an early age, and even as boys and girls they suffer torments of their own creation. The self-feeling does not allow them to mix freely with their fellows, but they have a tendency to live much in solitude and conceive a violent affection for one or other of their comrades, which affection may not be returned with equal ardor, and so endless quarrels arise if the beloved one forms a friendship with any other boy or girl. In some this jealousy with regard to members of the same sex continues through life, there being no feeling of the kind for the other sex, but in the majority of cases it is connected with sexual feelings, and instead of the loves of boys for boys and girls for girls we find insane jealousy of husbands and wives, and an equal jealousy also in the unmarried or widows who are keenly anxious to enter the matrimonial state. Envy and hatred as well as jealousy may be manifested here, and accusations of various kinds are launched against relatives and others who are supposed to come between the patient and the object of her choice. The most virulent and irrational display of this feeling is shown by wives towards their husbands, and in a number of instances some sexual trouble or perversion, or the change of life, is the origin thereof. It is sometimes carried to such an extent that a man's life is intolerable; he is accused of improper intercourse, or a desire for improper intercourse, with every woman he sees, young or old, rich or poor. If he enters a hotel or dines at a *table d'hôte*, he is told that he is looking at every woman in the room, and the scenes that follow are lamentable, to be terminated often in tears and reconciliation and reproduced the next day. Men, too,

have delusions concerning the wife's fidelity, but these are found in an early and acute state of insanity, and with recovery pass away. I have not known them to exist as a chronic monomania. Patients, while they have them, are dangerous and not unlikely to do injury to the wife.

Monomania of Hoarding.

Another monomania originating in the same selfishness and egotism of the insanely predisposed is that which we may term "hoarding." This is not uncommon among the chronic insane, and I have a case under observation at present in which it is the one or the most prominent symptom of an insanity which to an uninformed observer would be invisible. This young lady rendered her sojourn at home impossible by hoarding rubbish of all kinds in enormous quantities, refusing to allow the boxes to be unpacked in which she put it, and rendering the house intolerable for her relatives. She was not particular as to the ownership of the articles she concealed, and complaints arose as to missing things, for the disappearance of which the servants were called to account. When staying in a family she pursued the same system; hiding her money and saying it had been stolen, till a nurse was put with her who effectually controlled her doings.

I lately saw the room of a gentleman whose case might be called one of moral insanity. A more extraordinary sight I never beheld. It was filled with collections of rubbish, such as bags of orange-peel mixed with boxes of coins of some value, everything denoting the mania for hoarding. Another gentleman, also the subject of moral insanity, would pocket and hoard and arrange in his room quantities of small stones picked up on the gravel-walks of the garden. These had in his eyes some mysterious value. When they attained a bulk which became a nuisance they were confiscated by the housemaid, whereupon he made no complaint but straightway commenced the accumulation of a fresh series. This gentleman's insanity was the outcome of an inherited tendency greatly augmented by drink, and the craving for the latter is as strong as ever, so that, were he released, he would return to inebriate habits without the slightest delay. Many of these monomaniacal men owe their condition to drink or blows on the head, being already constitutionally predisposed. It is a combination of evil omen, and the prognosis in all such cases is exceedingly bad. The former as well as the latter gentleman was also the victim of drink; after apparent recovery he was released on probation, but soon relapsed.

Monomania of Persecution.

This, which is perhaps the commonest of all the forms of partial insanity, may come about as a primary disorder, or may be left as a secondary residuum of an attack of mania. There are many who by nature and constitution are very ready to develop the monomania of persecution. They are individuals who by reason of an egotistic self-consciousness are always in a state of suspicion of others, or think that their position and merits are not sufficiently appreciated, or that they are the object of slander or insult, or are being belittled in some way or other by persons known or unknown. Many go through life with this temperament, always fearful, always suspicious. One sees it constantly among the friends of our patients; if their relative does not at once improve and rapidly recover, they suspect that we are not trying to cure him and that we only wish to keep him for profit. They may not be insane, but the tendency to insanity is strongly marked. According to the environment, such people may be checked and controlled, or allowed to run on to a dangerous state of delusion. A sensible wife may allay a man's fears or suspicions, a foolish one may encourage and augment them. Men occupying prominent positions, as the rector or vicar of a parish, or the head of a firm or society, may be fearful of what is being said of them and willing to listen to all the gossip and scandal of a parish. Let such a one, with all this predisposition to morbid fear, get out of health, or encounter some disaster or shock, he will very likely manifest insanity, and his insanity will take this form.

We see every day how patients at the commencement of either mania or melancholia think that every one in the street is looking at them, and no less common is the delusion that their food is poisoned. These ideas are bred out of a feeling that there is something wrong, that there is a change, and that people in the streets notice it and attach some importance to it. And from strange internal sensations and discomfort arises the fancy about the food. But these may be but passing fancies, to be soon lost or merged into others more serious. The fixed delusions to which we give the name of monomania are of a more serious nature, though they may include the others within them. Out of hypochondriacal fancies may be generated a whole host of morbid ideas, such as that electric shocks are being given them by wires running under the floor or in the walls, and this is very likely to become more general when so many houses are nowadays being wired for electric light. So again mesmerism is called in to account for the various pains and aches

which the patient suffers, or thinks he suffers, for these people will describe their sufferings as the agonies of the damned, and yet eat, drink, sleep, and look the picture of health. Then there is spiritualism, another mysterious and unknown region, which plays a great part in the generation of these delusions, together with its congener hypnotism. All such persecutions the patients believe to be practised on them by people in or out of the house, by way of torture and punishment. They may think that it is done by those who are in authority in the house or asylum, and bitterly reproach them for their cruelty, or by those in subordinate situations without the knowledge or orders of their superiors, or by people wholly unconnected, who from outside by some mysterious or supernatural means work upon and torture their limbs and bodies. Persecution, too, may be of quite another kind. Instead of molesting the body the persecution may be directed against the position and character of the individual. Unknown and unseen enemies are traducing him, blackening his reputation, or trying to turn him out of his situation or society. Sometimes these persecutors may be identified and named, but more commonly they are unknown. Not unfrequently, however, the patient imagines the police are after him for some crime of which he is falsely accused, and I have known a man come joyfully into an asylum because he was assured that in it he would be safe from the police. Another who was long under my care was terribly afraid of the police. He was not melancholic, but, on the contrary, was the life of the asylum, but he would only go out of it by night or with some one to protect him, and if he came from it to my house he would take all the back streets and devious ways to avoid being seen. He got so well at last as to be apparently cured of his delusion and was persuaded to leave his place of shelter, but when he had done so he almost immediately went out of the country, and, so far as I know, never returned. I suspect he never really lost the delusion, and the lack of shelter probably intensified it.

More dangerous still are the patients who suffer from hallucinations. These are almost always hallucinations of hearing, which haunt them perpetually and cause the greatest torment—a torment often unbearable. Some authors, following Lasègue, consider this kind of hallucination as the only one essential to persecution-mania. It certainly is the most common, especially in a chronic form, hallucinations of sight belonging to a more acute state. Those of taste and smell occur, however, patients thinking that their food is contaminated by their enemies, or that foul odors are created to annoy them. The hallucinations of hearing are by far the most tormenting. Beginning by mere sounds or single words they advance

to sentences, and the "voices" uttered by the invisible persecutors accuse the sufferer of everything that is wicked and abominable, the charge of unnatural offences being perhaps the most common among men, and that of impure conduct among women. I have known various patients who were sane in all respects except for these voices, and their friends could hardly be persuaded that they were dangerous lunatics, dangerous to themselves and often dangerous to others.

It is very common for such persons to appeal to the police or a magistrate to have the "voices" and accusations stopped, needless to say without success. Then they wander about from place to place to avoid them, and in a new place they may for a few days find rest and peace. Then it begins again, and again they wander forth. Worn out at last by the persecution, disturbed at night by the voices and so lacking sleep, they at last lose control and shoot, it may be, some innocent passer-by in the street who has, they think, uttered some foul term of reproach. Many a murder has been committed in this way, and some, the motive for which has remained a mystery, may be explained by the hallucinations of hearing which have never been divulged. For some patients keep these a secret and refuse to talk of them, so that it is very difficult to elicit the fact that they are thus persecuted. Others, on the contrary, complain of them to every one and seek aid in order to bring about the cessation of their torments. But all in vain. Neither flight from the place of torment nor the assistance of the authorities or friends brings relief, and not unfrequently it happens that the sufferer, goaded to desperation, takes his own life and so makes an end of it.

Treatment does little for these people. The persecution continues in spite of all we can do, and neither argument nor demonstration can convince them that the mischief lies in their own heads and not in the next house. Sometimes there is a remission and for a time the voices cease, to return if health is out of order or any disturbing cause upsets the nervous system. The most that we can hope for is that the sufferer may in process of time become habituated to the sounds and words he hears, and learn to disregard them. This I have known to happen occasionally, but even in these cases that which may be disregarded at one time becomes at another an active torment which may impel the hearer to homicide or suicide.

It has been stated by some of the French physicians that in some of these cases there is a transformation, and that the delusions of persecution are replaced by an insanity of grandeur, or that the latter exists simultaneously and in juxtaposition with the former, and some writers go so far as to say that these ideas of grandeur appear at a certain stage of every case and indicate the ultimate organization

of the disorder. In this they are undoubtedly mistaken, for many patients live to old age without any manifestation of exaltation and deplore to the last the persecution they undergo. Inasmuch as the delusions indicate the emotional state of the individual, and the same man is at one time sunk in melancholia and at another elated and hilarious in mania, so the delusions of the persecuted may vary according to their physical and emotional state; delusions of grandeur may be noticed supervening or coexisting with the old notions and hallucinations, but denoting a change in the feelings which may or may not be permanent. So far from this transformation existing in every case, I have found it a rare occurrence in my experience.

Monomania of Doubt.

This variety of insanity is by no means uncommon, but the symptoms range over a wide field and may bear other names according to the particular case and the view of the observer. The doubts may relate to abstruse questions concerning existence, religion, or conduct, or may have reference to the most frivolous affairs of every-day life. Like all insane delusions they relate to the patient, and whether they be upon difficult or trivial subjects, they equally unfit him for attending to his every-day duties and business, render life a burden, and may drive him to desperation, though this is not nearly so common as in those who suffer from the delusion of persecution. In many respects the disorder is akin to melancholia. The doubt as to whether one has done right or will do right, and the fear of doing wrong are closely allied to the delusion that one has done wrong and is about to be punished for it. But there are many who are not melancholic, but have various ideas, tricks, and ways which are a constant plague both to them and their friends. They are constantly harping on the past and wanting to put something right which they fancy they have done wrong yesterday, last week, or last year. The thing may be of the most trivial kind, some word omitted or some detail to be altered in something that has taken place, yet it assumes an importance which is altogether morbid, even if the whole matter is not a delusion. They cannot write the simplest note or sign the smallest check without a subsequent misgiving that they have done it wrong and a desire to recall it and do it over again. Sometimes it is the name over a shop which they have read and have a doubt if they have read it correctly; they are accordingly miserable unless allowed to go back and read it again. Sometimes they have said some word, perhaps a long time ago, and are not sure if it was correct or proper to say; and as the victims of the persecution-mania imagine that their enemies are

causing injury to their bodies and health, so the doubters continually hesitate as to whether this or that will agree with them, or whether something they ate a week ago is going to make them ill; and this hesitation about food may become serious and lead to the necessity for feeding them by force.

Another form is the doubt as to the personal identity of the individual himself or of those about him. This is not a sensory hallucination; the patient will admit that the appearance is the same, but will have doubts as to whether it is the individual real and unchanged. Hallucinations are as rare in this variety as they are common in the mania of persecution, and I have scarcely ever met with them, those which apparently are mistakes of the senses being in reality false ideas or delusions. One very common doubt is that of uncleanness. The patient imagines that he has touched something that is dirty, or that an animal has touched him, or that in some way or other he is likely to contract infection, and a perfect mania for washing seizes him, and this may be carried to such an extent as seriously to interfere with health.

The prognosis in these cases of doubt is more favorable than in the mania of persecution, and if the delusions are not extreme and do not force the patient into an asylum, we may hope that they will in time weaken or pass away. The absence of hallucinations, especially those of hearing, materially favors the prognosis, these being the most organized of all. With regard to treatment, if an asylum is not necessary, constant change of scene and surroundings probably will do more than anything to allay the doubts. Those about a patient should without discussion ignore as much as possible the delusion and make him conform to the ordinary mode of life, regardless of his fears. Direct argument, or even direct ridicule, only tends to confirm and stereotype it. But, like delusions in general, it may wear out by being let alone. The health must be attended to; many are anæmic from worry, perhaps starved if their fancies relate to food, and the worry will render sleep defective. We may have hope of dispersing the delusion under favorable circumstances, but it often happens that when one doubt is set at rest, another springs up to take its place.

General Paralysis of the Insane.

This form of insanity has for every one engaged in the study of brain disease an interest which is possessed by no other. There is no other cause of death among the male insane which is so common or engages our attention so constantly; there is no other mental disease which from its commencement to its end is so closely watched

and carefully treated. And yet observers are still doubting and debating whether it is a definite and specific disease, or only a variety of cortical encephalitis. So greatly does it affect every portion of the encephalon that endless controversy has arisen as to its real seat and the tissue which is first affected. Yet no other variety affords such opportunities for post-mortem examination, as hundreds die every year under the care of skilled pathologists, and die in asylums where every facility for careful examination exists.* Another source of interest is the fatal nature of the malady. In spite of all the care and remedies which our asylums bestow on a large number of paralytics, and the experience gained by treating so many, we have not yet discovered a cure. Equally a subject of controversy is the cause of the disease, its connection, if any, with syphilis, and its relation to spinal disorder, symptoms of which are frequently found. On all these subjects physicians have written, and are constantly writing, till a large mass of literature has accumulated in various countries.

Who are the victims of this fatal malady? Unlike other forms of insanity it especially attacks men. Of the yearly average of general paralytics admitted into the asylums of England and Wales during the five years 1889–1893, 1,167 were males and 281 were females, and the proportion compared with the total average number of admissions was 14.5 of males and 3.3 of females. The females are almost all of the lower classes; it is the rarest thing to find a lady the subject of it. Dr. Clouston says he has seen one. I have never seen one, though I have met with it in one or two women who were married to gentlemen. It is doubtful whether it attacks more of the men of the upper classes or of the lower; but it is exceedingly common in both. And it attacks healthy, vigorous men in the prime of life, not the weakly neurotic valetudinarian. It is a common disorder among insane men of middle age between thirty and fifty-five. It is uncommon among the young or the old; at the age of sixty it is rare, at seventy it is unknown; it is rare but not unknown in children. In the *Journal of Mental Science*, XXXIX., 355, Dr. Wiglesworth records eight cases of general paralysis occurring at puberty, the age of the youngest at the commencement of the disease being twelve, that of the oldest sixteen. Five of the cases were girls and only three boys; there was hereditary tendency in four, probably in five, and in two others marked alcoholism in one or both parents. In the same journal (XLI., 482), Dr. Dunn gives the case of a girl, aged nine and three-quarter years, who died in the Berks County asylum of this disease.

* According to the Commissioners' report, 1895, there died of general paralysis in the county and county-borough asylums of England and Wales 1,206 patients of a total of 5,926 deaths, and post-mortem examinations were made in 947 cases.

The conclusion one arrives at from the description of these cases is that if all such are to be classed under the head of general paralysis, then the symptoms of the disease are infinite, and the opinion of those is right who say that we have not one special malady, but a number of allied maladies, to examine.

By far the largest number of the insane who suffer from general paralysis present well-marked and typical features. Putting aside for the present the ill-marked, anomalous, and pseudo-paralytic cases, let us consider what it is which we most commonly have to note. There are said to be three or four stages in the course of the disease. Like everything else, it has a beginning and an end, and there is of course an intermediate period of varying duration, but frequently a patient advances with gradual but certain progress from the beginning to the end without any marks whereby we can fix the dates of any stages of the illness. The first stage is called one of *alteration*, and it may vary much in duration, being extremely brief and lasting only a week or two, or noticeable for months or even years. Friends looking back will remember a certain alteration in the man, not much thought of perhaps at the time, but which accounts for odd things done by him and only looked upon as eccentricities or unusual. A lady told me that the first thing which showed that something was wrong was her husband, a grave and reverend clergyman, meeting her at the station, on her return from a visit, with a white hat on his head. These patients do things which they would never have done formerly; their highest moral nature is reduced, and the failure is shown in many ways. They are regardless of propriety, honor and honesty, will appropriate things which do not belong to them, will run after women, and do this in the most foolish way, never heeding the consequence, the person, or the place; and intellectual degeneration is manifested equally. In this there is a great contrast between general paralytics and those suffering from ordinary mania. The latter are often exceedingly acute, and will defend their acts, will reason and argue sharply, and explain away their misdeeds in a way which may baffle their cross-examiner. Not so the former, who cannot argue and generally deny that they have done that with which we tax them, and frequently their denial may be genuine, for they have forgotten it altogether. Their forgetfulness is very evident in this stage, and it is often difficult to say whether it is real amnesia or a want of attention which is constantly bringing a man into trouble. He forgets the time of day, the time of meals, is heedless of appointments, arranges to do something or go somewhere and then forgets it and wishes to do something else. In the same way his want of attention leads him to acts, such as exposure of his person,

of which he seems quite unconscious. He will also through the same defect go on drinking wine till he has too much, or buy articles beyond his means, buy the same thing over twice, or make presents to people who do not want them and would prefer not to have them. He is quite unfit for business, and what he undertakes he mismanages; in calculations or accounts he goes wrong, and a letter written at this time is markedly unlike his former correspondence. The loss of attention and memory is observable in many ways, and especially is he likely to forget what he has done a day or two previously. Not only will he be forgetful, but also apathetic, careless, and indifferent about that in which he formerly took great interest, and in all his new schemes and projects his attention soon flags. We see, in short, in his whole life a weakening of mind, moral and intellectual, such as may be noticed at the commencement of senile dementia, but which occurring in a fine and vigorous man of, it may be, thirty-five, too surely indicates the ruin even now commencing. The loss of attention was well marked in the case of a gentleman whom I was asked to see at a very early stage of the disorder. I was invited to breakfast at his house. He was not to know I was a physician nor was I to make any special physical examination. I breakfasted in the company of his wife and mother; he came in late, took no notice of me or the others, and ate his breakfast in a hurried and slovenly manner, saying very little and soon departing. He seemed quite unaware of my presence. I saw enough in his general deportment and heard enough from the others to diagnose general paralysis, and several years after I was sent for to the same house, found him moribund, and he died half an hour afterwards.

In this early stage the patient's mood is upon the whole dull and morose rather than excited and expansive. He may even be gloomy and melancholic, and I have known a gentleman be placed in an asylum for well-marked symptoms of melancholia which gradually passed away and were followed by the grandiose ideas of the second stage. This first stage will vary in duration according to the temperament of the individual and the necessity which may arise for interfering with his actions. If he is in a quiet country-house, is easily coaxed and controlled, and has nothing to irritate him, some time may elapse before what is described as the second stage supervenes. I have, indeed, known cases which drifted on gradually and quietly into the dementia of the third and final stage without any of the maniacal symptoms of the second, and never required throughout anything but the ordinary nursing of friends and attendants.

The physical condition at this time betokens the changes which are going on in the brain. There is often considerable vasomotor dis-

turbance, flushing or pallor of face, slow circulation, headache, and troubles of sight and hearing. And very early there may be one of those "congestive" attacks which are so common later and vary from violent pain and faintness to convulsion. We learn that there has been "a fit," and the friends are now seriously alarmed. A gentleman I saw lately who was mentally only in the first stage of alteration had two of these attacks a few days after my visit. They were very slight, but for some minutes he could not speak. They were called by his medical attendant *petit mal*. Even at this early stage, when no one could have signed a certificate of insanity, there were pin-point pupils and a total absence of reflexes. There may be even as early as this a certain tremor or twitching of the facial muscles and a fibrillary quivering of the tongue, and when the patient is quiet and not talking or being talked to, we may notice a dull and heavy look; he does not attend to what others are saying or join in the conversation unless appealed to, and though he is the subject of it and his health is discussed by his relatives, all he can say is that it is "perfect," and that he was never so well in his life, rejecting with a silly laugh all our advice and warnings. Even now there may be some alteration in gait. If he is tired he drags one leg a little, or he is fatigued after a moderate amount of exertion which would have been nothing to him formerly.

This first stage or period will last for a varying time till some congestive attack or excitement occurs, or something requiring opposition or interference rouses him to fury, and then we may have insanity of the most violent and extravagant kind, necessitating in the majority of cases removal to an asylum for the safety of the patient. There is one great peculiarity about the mania of these people. Almost all, certainly nineteen out of twenty, are full of ideas of their exalted station, their wealth or strength, and are perpetually boasting of it. They are self-satisfied in no ordinary degree, and think themselves the most wonderful people in the world. They screech or sing, and tell us they are the finest singers in Europe; they daub some color on paper, and say that they have drawn pictures which are to be hung in the Royal Academy exhibition, and sold for thousands. Nothing is too absurd; an ordinary maniac may have grand ideas and have his writing-paper engraved with a coronet, but once a duke he remains a duke, and reasons more or less from a ducal point of view. But in the paralytic there is no reason; he is a duke, a marquis, a king, and an emperor all in one, and is going to marry the Queen and all the princesses. The want of attention and the forgetfulness noticed already in the early stage are still more marked now; he cannot argue about anything he asserts, but only becomes con-

fused. The ordinary maniac holds to his delusion and justifies it, the paralytic has forgotten to-day what he said yesterday; yesterday he had millions, to-day millions of millions; his horses and carriages, houses and lands, grow in the same proportion. Although he may be angry with us for placing him in an asylum and keeping him there, he is nevertheless going to present us with a few hundred thousands, to build a palace and have us and all the attendants to live with him, or go round the world in the largest vessel ever built with the same people for company. The mental state in the time of the excitement is very emotional, and the sufferers change rapidly from violent anger to silly hilarity. The weakness of mind which is so manifest from the first enables them to be managed by good-tempered and clever attendants without much difficulty, for they can easily be put off and their wrath turned aside by holding out the hope that that which they desire will be granted "to-morrow." They have no reasoning power and no memory, so when "to-morrow" comes they forget they were told the same thing yesterday:

> "To-morrow, and to-morrow, and to-morrow,
> Creeps in this petty pace from day to day,
> To the last syllable of recorded time."

To bear out all these ideas of splendor and rank the paralytics, and especially the paralytic women, will decorate themselves with any tinsel, finery, or rubbish they can collect, and the ornaments of Christmas trees or crackers are carefully hoarded and displayed on their persons. Moreover they are often erotic and indecent, and both men and women will boast of the children they are to have and their number and beauty.

Though the great majority of general paralytics present this *délire ambitieux*, this expansive gaiety and grandiose ideas, we here and there meet with one whose delusions are melancholic, and these may prevail throughout with a curious mixture of boasting even with the gloomy ideas. Some few refuse their food, alleging that it is poisoned, or have hypochondriacal fancies that their inside is all wrong or all gone, and that on this account they ought not to take food. This state, in my experience, does not last long. I had much trouble lately with a gentleman whose physical symptoms were well marked but who was not exalted, and for a time thought his food had been tampered with. But just when it appeared that he would have to be placed in an asylum and fed by force, the delusion vanished and never reappeared. He rapidly passed into a state of childishness, and remained so for six and a half years, when he died of some slight lung trouble. Many, even of the melancholic paralytics, are very

fond of their food, and like the grandiose will eat it ravenously. The whole of the melancholia is tinged with the childish, self-satisfied feeling which characterizes the disease, and it is rare for them to attempt suicide and still rarer to succeed. In many we find hallucinations, especially of hearing, when they may be terribly worried by "voices." These all are patients in a more or less acute state, and such cases run a rapid course. Hundreds of patients, however, pass through the various stages, and decline and die without having had hallucinations of any of the senses.

Whenever we find these exalted ideas and notions of prosperity, wealth, or strength, even if they do not amount to palpable and gross delusions, our suspicions ought to be aroused. If the only assertion is that the patient was "never better in his life," that his condition is "perfect," there is cause for alarm if we hear from his friends that he is not himself, and that his altered state has given them anxiety. Close examination must be made and physical symptoms, if any, detected. Probably the earliest is defective articulation; if we watch the patient closely, in the midst of his boasting assertions, and if he is somewhat excited, as will certainly be the case if he is contradicted, there will be noticed a tripping or stutter in the enunciation of a word or the syllables of a word, which much resembles that of a man somewhat in liquor, who cannot say distinctly such words as "truly rural." The patient has to make an effort to get out a long word, and by shouting it may succeed; without such an effort he fails. Dr. Conolly said that "at the very commencement there is in these patients not a stammer, no letter or syllable is repeated, but a slight delay, a lingering, a quivering in the formation of the successive words or syllables, apparently from a want of prompt nervous influence in the lips and tongue." When the individual is speaking slowly and quietly, this may be difficult to detect, and it may vary much at different times, but it is a symptom of the paralysis which later is to invade the whole body, and has even now attacked the lips and tongue. At the same time tremor of the lips is constantly found, particularly of the upper, or, on the other hand, stiffness and immobility. The facial muscles too, those of the forehead, cheeks, and nostrils are also subject to twitchings and contractions. When the patient is asked to put out his tongue, we notice ataxic jerks and want of control in the movements, and a fibrillar tremor of the muscles will also be apparent. This paralysis, as the disease advances, may become so marked as to render the speech wholly unintelligible so that we hear nothing but a confused jargon.

If the articulation appears to be unimpaired and teaches us nothing, we may learn something from an examination of the pupils of

the eyes, and one thing which we expect to find is inequality. This may vary, being sometimes so slight as to be doubtful, sometimes very marked, and it may not be constant, appearing on certain days, and being absent on others. Occasionally there is irregularity in the contour of one or both pupils which may be oval or have lost the circular outline. Moreover, there is in some even at an early stage a state of contraction so that the pupils are extremely small, pinhole pupils as they are called. "In the early stage," says Bevan Lewis (*op. cit.*, p. 266), "we shall have these signs in a large proportion of paralytics, a moderate-sized pupil, slightly larger than its fellow, sluggishly reacting to light, even to a bright beam, and absence of the sympathetic dilatation which should occur on irritating the skin. In the most advanced stages the larger pupil will be found quite fixed to light or may contract very partially, and if a strong beam of light be used the initial slight contraction is followed by a sudden dilatation beyond its original limits, remaining wide throughout the illumination of the retina. Although there is this absence of light reflex in so many cases, yet the associated movements of contraction and dilatation of the pupil during the act of accommodation and efforts of convergence are affected only in the later stages of the disease, and in 11.3 per cent. only of the patients examined was it lost in both eyes; whilst as many as 63.6 per cent. showed perfectly normal response." On the whole I am inclined to place more reliance on the want of reaction in the early stage than on irregularity of pupil, inasmuch as the latter varies greatly on different days and is often very doubtful.

At this stage of the malady there may be little to notice in the gait or muscular power, and fault has been found with the term general paralysis, as not being applicable to persons who are active on their legs, strong in the arms, able to fight vigorously those about them, or climb over walls or through windows in order to escape. But though there is all this apparent strength, we may at the same time see that the deep reflexes are abnormal, for the earliest phenomenon is an exaggeration of the knee jerk. As time goes on and the disease advances, this exaggeration will give way to a sluggish state and by degrees to a total absence, but even then the patient may be able to walk fairly well. There may be a dragging of one leg, even when the reflex is exaggerated, this depending on one of the convulsive seizures which so often occur, or on spinal change, and varying much from time to time. Besides a dragging of the leg, the gait may be slow or unsteady, the legs being jerked and not moved steadily, and if the eyes are closed, the patient cannot walk or turn round, or even stand with the heels together. Sometimes

these tabetic symptoms occur very early, and I have known two cases in which they were observed even at a time when it was not possible to sign a certificate of insanity, though there was evident *alteration* in the mental state of the patients.

In many instances we find that by this time there has occurred something in the nature of a "fit," which may happen very early, before the mental symptoms are fully developed. If it is at all severe, the friends are greatly alarmed and ascribe all that follows to the attack. They will declare that there was nothing the matter before, and will not believe that it is only one symptom of the general disorder. The "congestion," on the other hand, may be very slight, and only indicates its occurrence by the loss of power which follows, generally on one side, or by a temporary aphasia. Seldom do we find genuine epilepsy or *grand mal*. Consciousness is not entirely lost, but convulsions occur, generally unilateral, or there may be simply a collapse and general paralysis which gradually passes off again, leaving the patient a little weaker than before. I have known an apparently very slight attack followed by deep coma from which the sufferer could not be roused. This passed off in a day or two as I foretold, the friends who thought death was near being much astonished at the prediction and fulfilment. I believe such a severe attack to be one of great congestion without any apoplectic hemorrhage, and that many of the so-called "fits" are congestions of a slighter character, for the head is hot and the temperature rises. The sequelæ are all that we notice, for we find a man in the morning unable to stand or to move an arm or hand, and yet this will all pass away in the course of a day or two. Few go through the stages of the malady without some attacks, slight or severe, of this nature. They often divide the illness into defined periods, the patient never quite regaining that which he lost through their occurrence. Those succumb soonest who have most, and frequently a succession of fits will terminate life at a comparatively early period. This is the case not unfrequently with elderly people or those who were weakly before the disease began.

There is considerable difference in the sexual power of general paralytics at this stage, as there also is in the reflexes. Some lose all sexual desire or power at an early period, but many show great sexual excitement and worry their wives, or run after strange women, and in confinement they indulge in constant masturbation, and their conversation is erotic with hallucinations or delusions of a sexual character.

Another symptom which is characteristic of the disease is the handwriting. Often we may detect the peculiarity in a letter otherwise tolerably coherent and rational. It is not a mere tremor in the

formation of the letters, for this may be noticed in the writing of those who are old, or paralyzed, or feeble from illness or other cause. There may be the tremor and the writing will be blotted and the paper dirty, but beyond all this we notice words left out, or letters or syllables, even when the writing itself is tolerably good, pointing to the want of attention which is so constant in the malady, and we may find it at a time when other symptoms are not very prominent. A few months ago a patient's brother sent me a letter, and asked me how I could say that the writer of so good a composition was out of his mind, yet I never saw a letter which more clearly indicated that the writer was suffering from general paralysis. It may improve, if under treatment the patient loses the excitement and passes into the stage of remission, and in fact it will vary from week to week, according to his condition.

A paralytic patient may often be easily managed for a time by coaxing or promises, but generally there comes some occasion on which when thwarted he breaks out into dangerous rage and excitement, and can only be restrained by force. It then becomes a question where he is to be treated and, as in all insanity, expense usually solves the question. Unless the friends can afford a house with garden sufficient for exercise and an adequate staff of attendants, to an asylum he must go, and for many an asylum is the best place as it is the safest. General paralytics carry their dementia into their violence, and are more dangerous in their attacks and more reckless of consequences than any other class except, perhaps, epileptics. They are easily pacified by judicious attendants, and in their weakly emotional state are angry and good humored by turns. We have here a maniacal condition which may last for weeks or months; the patient is noisy, destructive, tearing clothes and bedding, or breaking windows, trying to escape in silly and dangerous ways, attacking attendants in a manner regardless of consequences, and yet with all this fury and violence it is not like an ordinary case of acute delirium or acute mania. Paralytics may sleep but little, but sleep is not altogether absent, and they do not die for want of it or from the exhaustion of the maniacal paroxysm. They generally take food well, often voraciously, it being quite the exception for them to refuse it. If they conceive a delusion about its being poisoned, it does not last long and is soon forgotten in the absence of memory which is characteristic of the disease, and is one reason why the delusions are so constantly changing. Such patients in this acute condition preëminently require a padded room, that they may not constantly come into collision with the attendants, for their ribs are more brittle than those of other people and liable to be broken in a furious struggle.

The maniacal condition will gradually subside, for patients rarely die in it, and then will follow one of two conditions. Either there is gradual improvement, to such an extent it may be that the relatives rejoice and declare that recovery is complete, or the stage of dementia commences and gradually progresses to the final extinction of mind and life. The remissions, for we cannot call them recoveries, vary very much in degree and duration. In some there is a wonderful disappearance both of bodily and mental symptoms, the improvement lasting for some time. These are called recoveries, and are quoted as instances of the cure of general paralysis. Patients may lose the delusions or be able to conceal them, may be able to travel, write a good letter, live quietly and orderly in their families, and pass as sane men in society. But all those that I have known, apparently well and recovered, have long since died, and no one that I have ever seen has really recovered and been himself again. They remain in this satisfactory state by dint of perfect rest and quiet, but if they return to their business or profession, and try to force the brain to do its ordinary work it fails, and a break-down ensues with a recurrence of the excitement or a hastening of the dementia. Where it is necessary to appoint legal guardians of a patient's property, it is advisable to do it as early as possible after the first outbreak of excitement and delusions, inasmuch as it may be more difficult if the period of remission and apparent recovery has set in. On the other hand, if such appointment has been made and the management of his affairs taken out of the patient's hands, such proceedings should not be lightly superseded because he is better and his friends think him recovered. In some cases there are physical signs of the disorder left, even when there is great mental improvement. There will be noticed some difficulty of articulation, some weakness of walk, or shaky handwriting, irregular or unequal pupils, or a general feebleness. All this points to the continuation of the disorder even when the mind is apparently clear, and is a warning that a return to former life and occupation is not to be looked for.

If no remission occurs and no apparent recovery, the sufferer will remain for a longer or shorter time in what has been called the second or stage of alienation, and then gradually pass into ever-increasing dementia. The excitement will be less, but the exaltation remains. Though shut up in an asylum, and living among and taking his meals with a number of others whom he recognizes to be insane, he is none the less a king, a duke, or a millionaire. He writes to the shops which advertise in the newspapers, and orders everything he reads about, and though his orders are never executed, he writes them day after day and week after week. He thinks the asylum a palace

and his own property, and takes little notice of his own relations, so wrapped up is he in the present and the future, and so oblivious of the past. In some cases hallucinations of hearing torment him, rarely those of sight. There may also be disordered sensations of the viscera or disordered muscular sense. The mental condition of all these paralytic people is one of supreme happiness, and this is the only redeeming feature of it. They retain to the last their grandiose ideas, and vaunt their wealth and strength when they are not able to stand alone or lift the food to their mouths.

The bodily health gradually declines like the mental, but will vary from time to time; one day it will appear as if the end was near, and a few days after the paralytic will be walking about as if he had a new lease of life, the explanation being that a fit of congestion had brought him low from which he has again rallied. Frequently after the excitement has abated, the patient puts on flesh and becomes very stout, and friends say how well he is looking, but this subsides, and in its place we may find emaciation in spite of the administration of a large quantity of food. This is very likely to be the case in cold weather, for so low is the nerve power of these people that they are extremely susceptible of cold, and it is most difficult to keep them warm even in well-heated rooms. The paralysis which affects the muscles of speech also impairs those of deglutition, and the act of swallowing is attended with much difficulty. The patient may, if left alone, go on cramming food into his mouth without swallowing till it is full, and the consequence is that he either gets it impacted in the œsophagus so as to compress the larynx, or else gets it into the larynx and trachea. From one or other of these accidents choking is a not infrequent mode of death in this disease, and the greatest care ought to be taken that a patient shall not eat alone or without an attendant at his side, for instant suffocation may be caused by a mass of food becoming impacted. It is better to feed all such with a spoon rather than let them feed themselves.

The last stage of these patients is one of mere existence—paralysis which may truly be called general, and the most complete extinction of mind. They are wet and dirty, and extreme care is required to keep them from bedsores; in many cases no care is sufficient to avert this undesirable event if the vital power is greatly reduced. Yet with the rally which sometimes takes place, I have known the sore places on the back and the heel of a patient get quite well and remain so for some time, till a fresh reduction again laid him low. A symptom frequently noticed at this latter period is loud grinding of the teeth. For hours together a man will sit and grind his teeth, making a most horrible and discordant noise. The duration of the final stage varies

much. A gentleman was brought to an asylum in a somewhat advanced state in January, 1891, and after some epileptiform attacks became in a few weeks completely paralyzed and speechless, not recognizing even his wife, not moving hand or foot. He looked as if he could not last more than a few days, but he remained in precisely the same motionless and speechless condition for three years, neither better nor worse, unable to raise his hand to his face, but without bedsores or other complication. In January, 1894, a bronchial affection carried him off.

We are often asked, and it is important for friends to know, what is the probable duration of the disease which we pronounce to be fatal. Writers vary much in the estimates they give according as their experience is derived from the inmates of crowded pauper asylums or from paralytics who have the best food and nursing which money can command. "The duration," says Dr. Mickle, "varies from a few weeks or months to one, two, three, or more years; a few cases last more than five, ten, or fifteen years, and cases of even longer duration have been reported, but if genuine are, at least, exceptions which prove the rule. The duration is often long in the 'ascending' form where the spinal cord is first affected." The longest case within my recollection was that of a gentleman on whom a commission of lunacy was held in the year 1858. He was undoubtedly suffering from general paralytic symptoms at that time, and had shown signs of brain affection and epileptiform attacks as far back as 1856, having been married in 1855. This gentleman lived in an imbecile state till 1883. Dr. Clouston gives the case of a patient who had the symptoms of the disease on his admission in 1860 and was alive in 1882. In my experience the average duration of those who can command careful nursing and every appliance and means for taking care of them is about five or six years, but many are cut off by fits at an earlier stage.

Diagnosis.

It is of the utmost consequence that we should make an accurate diagnosis when a patient is brought before us who may be a general paralytic. In a large number of cases this is attended with no difficulty. A fine, healthy-looking man of thirty-five or forty is presented to us exalted and hilarious, and even as he walks across the room we notice that the pupil of one eye is larger than that of the other. It is a typical case and five minutes are enough for a confident opinion. But as there is nothing easier than the diagnosis in hundreds, so is there nothing more difficult in a certain minority. To arrive at an undoubted decision at one interview or inspection is

very often impossible, and yet it is this which we may be called upon to do. Patients are constantly sent to asylums as general paralytics by medical men who certify them as insane on account of their extravagant delusions, but who only see them once and have not the means of examining them carefully. There can be no doubt that mere mental symptoms and delusions, even of the most exalted kind, are not sufficient of themselves to render the diagnosis beyond question, if we can discover no somatic conditions. But even about the latter there may be great difference of opinion. About unequal pupils we may be tolerably confident, but even here I have known friends declare that this has been the case for years, and it sometimes may be seen in the sane if the accommodation has been overtaxed. Tremors of the tongue and the jerk with which it is protruded are open to controversy. If we examine non-paralytic patients, and they are nervous under our scrutiny, they may jerk their tongues out and in, especially if they are ladies who do not care to show them. The tremor may be due to nervousness, as also the tremulous condition of the facial muscles; in the early stage the knee-jerk is not generally absent but exaggerated, but whether it is exaggerated or not in a particular patient may be open to question. It is the conjunction of a number of conditions which strengthens our opinion, but the question is often one of the greatest difficulty, and it is as well to say after one interview that our verdict is provisional, and can only be confirmed or disproved by the progress of the malady.

Some years ago a gentleman was brought to me and both the certifying medical men, one of whom was an expert, pronounced the case to be one of general paralysis. He had been violent, associating with prostitutes, and exposing his person. He was very foul and abusive in language but had no exalted ideas, and I could not discover any physical signs of paralysis. He rapidly improved and in a month was fit to be removed, but lived for some time afterwards as a precaution with a medical man. The rapid improvement and absence of the usual symptoms made me think that it was not a case of general paralysis but of alcoholic disorder. This opinion was altogether scouted by his friends. About six months later he came to me perfectly well and asked me to give him a certificate that he was well enough to return to his business, which I did willingly. Some four or five months afterwards a friend said, "You will be sorry to hear that poor X is in ——— Asylum in the last stage of general paralysis." I *was* sorry and not a little surprised. Eight or nine months afterwards the patient again walked into my room to show me for the second time that he was quite well. It then came out that alcohol was the cause of both the attacks, but that so severe was the second that a

general paralysis both of mind and body was the result, a paralysis so complete as to deceive some of our leading experts. Fortunately for the patient the symptoms passed away and gave him such a lesson that, so far as I know, he has never broken down again. The drinking throughout had been secret and the practice was not within the knowledge even of his nearest relations. The rapid improvement in the first instance and disappearance of all mental disorder in a month made me confident that it was not a case of general paralysis, but I was greatly confounded by the news I received the following year.

Another man was brought to the same asylum who, it was said, had exhibited signs of general paralysis for the past six months. He had been squandering money, neglecting his wife and children, associating with prostitutes, and ordering numerous things from tradesmen. At last he was arrested on a charge of obtaining goods under false pretences. This on admission he treated as a joke and said that he had won £20,000 on the Derby and £100,000 on the Oaks. He hired a carriage to go to the Derby and drove about London in it all day, never going to Epsom at all. He was found lunatic by inquisition upon the supposition that he was a paralytic, and went on for many weeks in the same way, inviting persons of distinction to dine with him, ordering four yachts at once and the like. In three or four weeks he became worse and quite incoherent, and it is recorded that there were tremulous movements of the muscles of the face. This was the only physical symptom noted, and it is one on which it is impossible to rely if it exists alone, for at a time of great excitement there may be this tremulous condition even in the sane, and the same may be noticed in those that are weak from previous illness. This patient was removed to the country and eventually recovered completely and remained well.

Our diagnosis may be considerably assisted by the previous history of the patient. I once saw a man who had the most extravagant ideas, who was going to make a tunnel through the earth, was going into Parliament, and had various projects by which he was to make an immense fortune. There were no physical symptoms, however, and nothing wrong with the eyes, and the history was that he had had a similar attack in India some years before from which he had recovered. Not unfrequently have I seen patients in an exuberant state of exaltation, spending money and behaving in a wild manner, and on careful investigation it has appeared that they were in the expansive and exalted stage of what the French call *folie circulaire*, that having gone through the stage of depression they had now entered that of excitement, and one could assert with confidence that this would again be followed by depression, that the exaltation was

not that of general paralysis, but that the alternation of the two phases would go on throughout life.

The previous history then is very important to determine the diagnosis of the disease. If we hear of a former attack, or more than one attack, from which recovery has taken place, the inference is that we have not to deal with general paralysis. The question, however, arises, Does general paralysis occur in the course of ordinary insanity? or if a patient recovers from an attack of mania or melancholia and breaks down again on a future occasion, is the second likely to be an invasion of general paralysis? Herein is involved the nature and pathology of the malady which must presently be carefully considered. Those who, like Dr. Clouston, consider it "a true cerebral disease as distinct from any other disease as small-pox is from scarlatina" will deny that ordinary insanity can be transformed into it, and think it unlikely that an attack of the former can be followed on a subsequent occasion by the symptoms of general paralysis. I knew one man, a member of the medical profession, who became melancholic and was placed in an asylum. His melancholia was of the ordinary kind, he recovered and went home, and some time after was brought to me with well-marked symptoms of general paralysis, said he was the King of France, the possessor of millions, and so on. He dragged one leg, and as this excited condition had only lasted ten days, I presume that he had had an epileptiform seizure. There was no further remission and he remained a paralytic till his death. The question here was whether the melancholia was but an instance of the depression which occasionally ushers in general paralysis, and the apparently sane interval only a portion of the prodromal or commencing stage, or whether the two illnesses were distinct, the general paralysis having nothing to do with the former melancholia.

The cases which are the most difficult to diagnose are those of subacute or acute mania with exalted delusions and ideas of wealth or grandeur. It is here that we have to examine closely for somatic symptoms, but at an early period it may not be possible to discover sluggishness or inequality of pupils or difficult articulation, and there may be a doubt as to an exaggerated knee-jerk, so that it will be impossible to pronounce an opinion without hesitation that the case is or is not paralytic, and subsequent examination alone can decide. Loss of memory, if found, will be of significance, but it may not be easy to test it if the patient is very maniacal and will not give himself the trouble to recall the past. Such a person being evidently insane must be kept under observation, and time will develop other symptoms if the disorder is paralysis.

Probably the cases after these which present the greatest difficulty are those of alcoholism, especially if it is sufficiently advanced to produce paralysis. The history of the patient narrated above well illustrates this; in his first attack the mental symptoms gave rise to the suspicion; in the second both body and mind were so prostrated that he appeared to be in an advanced stage of the disease. We may even find in some alcoholic cases a certain degree of the optimism which characterizes general paralysis. Dr. Batty Tuke[50] mentions several patients in whom he observed impairment of speech, walk, and memory with marked exaltation. Yet two recovered, three remained in a stationary condition, and one died of Bright's disease without developing further symptoms. There was one symptom absent in these cases—the pupils were not affected and Dr. Tuke says: "The indication which weighs most heavily with me is the condition of the pupil and retina. If, after careful weighing of the history and symptoms of a suspected incipient case, we find contracted or irregular pupils, and on ophthalmoscopic examination hyperæmia of the retina, the weight of evidence leans towards general paralysis."

In my own experience I have not found the exalted delusions which characterize general paralysis in patients suffering from alcoholism. There were none in the case which I have given. There has also been less of the convulsive stutter and tremulousness of the lips and facial muscles, and more of the tremor of hands. The delusions have been due chiefly to the great impairment of memory from drink. Yet recovery has taken place in many cases even after long periods of time. It is probable that the instances of recovery from general paralysis of which one hears occasionally may in truth be recoveries from this or some other form of insanity which simulates the usual symptoms of the graver malady. There are certain cases which Sir J. Crichton Browne has described as chronic "brain-wasting,"[51] many of which might be termed pseudo-general paralysis. The symptoms, he tells us, are headache of a dull heavy character, with pallor of countenance, cramp, or other anomalous sensations, or a sense of numbness or weight. Later a convulsive attack occurs affecting one or both sides, or, more commonly, paralysis is insidiously developed without convulsions. Muscular power is much diminished in one side or limb or in all the limbs; articulation is affected and the pupils are unequal. The temperature is rather depressed, and does not rise in the evening like that of the general paralytic, the mental symptoms are confusion and failure of attention with sluggishness and loss of memory. The emotional state is one of depression rather than exaltation, herein also differing from that of the paralytic. It resembles the last state of the latter, but there

have been none of the early symptoms. Recovery sometimes though rarely occurs.

The connection between syphilis and general paralysis is one on which something must be said hereafter. Syphilitic brain disease may be the cause of general paralysis or may simulate general paralysis, and it is difficult to say how we are to distinguish the one from the other. Dr. Duckworth Williams records a case of recovery from general paralysis in which the symptoms were well marked: thickness of speech, tremulous tongue and lips, uncertain gait, and *delire ambitieux*. This man got well under the administration of perchloride of mercury. Dr. Savage mentions one who had a history of syphilis; he was suspicious, thought people were going to murder him, tried to choke his wife, and cut his own throat. He had marked ptosis, external strabismus, and dilatation of right pupil, was dull and obstinate, wet and dirty. He was treated by perchloride of mercury and recovered. But these were not the symptoms of general paralysis. Where the patient presented the marked symptoms of the disorder, I have never known antisyphilitic treatment effect a cure, even if it was tolerably certain that the paralysis was due to syphilis.

Etiology.

The controversy as to the exact nature and pathology of general paralysis is by no means concluded. Before entering upon the question it may be well to consider the causes as they have been laid down by the various authorities and see whether from them any light can be thrown upon the peculiar character of this fatal disease. Dr. Mickle divides the causes into predisposing and exciting. Under the former head he speaks first of *heredity*, which he says is probably a factor in about one-third, more often in females than in males, the percentage of alleged heredity being less in private than in pauper cases. In my own experience I have not found it in as many as one-third, but it is difficult in private cases to get at the truth as to heredity. Of *occupations* those which entail worry, overwork, or emotional overstrain predispose, also naval or military life, prostitution, those which expose the workers to great heat and sweating, or the alternation of heat and cold, or alcoholic indulgence. There may also be predisposing *mental causes*, such as an anxious, straining life, moral shocks, or the struggle of existence in crowded cities. *Cranial injury* also may be a predisposing cause.

We have here, as may be readily seen, most of the predisposing causes of ordinary insanity. Is there anything among the *exciting causes* which is calculated to produce fatal brain disease? According

to some a common and even the most common cause is sexual excess, that is, excessive coition. That it exists as a cause, or as one of the causes, in a number of general paralytics is certain. In Dr. Mickle's opinion "it acts in alliance with other factors and forms a part of that general sensuality and fastness which so often incur this disease, or else is allied with a sanguine temperament and an overactive, protracted, and exhausting output of physical and mental energy. Cerebrospinal strain in a wide sense, and mental strain or overstrain are the great pathological factors of general paralysis."[52] Dr. Savage also says of this cause: "There are patients admitted yearly into Bethlem whose disease I believe to be chiefly produced by sexual excess; but such men are generally not only living lives of general excitement but are wedded to women of a specially amatory nature," and he also remarks that this excess is a common early symptom of the disease, and may be a symptom rather than the cause.[53]

It has been suggested that the disease may be due to a toxic cause, to such poisons as alcohol, syphilis, lead, or gout. The first two probably cause general paralysis not unfrequently, though it must be remembered that there may be alcoholic insanity and syphilitic insanity without general paralysis. Insanity from lead is not uncommon but the symptoms are rarely those of general paralysis, and gout cannot be a common cause or the disease would not be found in men between the ages of thirty-five and fifty rather than at a more advanced time of life. Dr. Mickle is inclined to attribute a toxic origin to general paralysis.[54] He does not say, however, whether he means toxic agencies from without, as those just mentioned, or toxins, as ptomains, generated within the body.

The exciting causes may be *mental and moral* as well as physical. Any severe strain whether of intellectual work or worry may light up the disease. It occurs at a time of life when work or worry has gone on for some years, not in the adolescent period when though work may be hard, worry is less, but in the age of full manhood when both may have long existed, and when the conditions of life entail dwelling in a crowded city with defective sanitation and very possibly alcoholic indulgence as the result of such a life.

Cranial injury is, I am certain, a cause of the disease in not a few cases, and it is one which may exist alone without any other factors. One man I knew whose symptoms followed a severe fall while hunting, there being no other cause discoverable. Dr. Fox[55] gives the case of a man who had lived a most careful life, in whom there was no possible trace of syphilis, who had a healthy family, had done his work easily, had had no worries or pecuniary anxiety. One day he was thrown from his carriage and from that time was a changed man.

Very shortly symptoms supervened which were as typical of general paralysis as anything could possibly be.

We ought to gain some information as to the causation of general paralysis from considering those who do not suffer from it as well as those who do. It is especially rare in Ireland, though alcohol is taken largely, though syphilis and venereal excesses must exist in the large towns, and exciting mental causes, as poverty and worry, must be as common as elsewhere. Yet Dr. Robert Stewart, for forty years superintendent of the Belfast Asylum, never saw a case of the disease, and his successor, Dr. Merrick, wrote in 1881 that he had had no case. In this asylum the inmates average four hundred and forty, drawn from an agricultural population and the large manufacturing towns of Belfast and Lisburn. In all the Irish asylums the cases are extremely rare, and not more frequent in those parts of the country which are the most Saxon than in the Celtic districts. Its frequent occurrence in Wales shows that the Celts have no special immunity, and though it is rare among the Scotch Highlanders, they do not escape if they take up their residence in the large towns. I have found it existing among the negro patients in the asylums of the West Indies, but the type here was not that marked by exaltation but rather by dementia; epileptiform attacks were not uncommon and often the cause of death. Dr. Plaxton, who at the time of my visit was the superintendent of the asylum at Kingston, Jamaica, was in 1880 the superintendent of the Ceylon Asylum. Thence he reported [56] that on his arrival almost the first thing that struck him was the entire absence of general paralysis. Since then he had had three cases in males which he considered to be examples of this disease. The first was in a condition of dull dementia with motor symptoms. Of him there was no history. The second was a hard drinker; he was when admitted in a state of delirious excitement which continued to the end. The third had had great losses in trading. He was excited, noisy and restless, had well-marked grandiose delusions, but the predominant emotion was towards depression. He died after epileptiform seizures. He had been a great smoker of bhang, and had marks of old buboes in the groins and some ulceration of the palate and tonsils. Asiatics appear to be free from the disease if they do not succumb to the vices and diseases of more "civilized" nations.

Who are and who are not the victims in England? It is very rare among the women of the upper classes. It is much rarer among those of the lower than among the men of the same classes. The lower-class men are more liable than those of the upper. Can we deduce anything as to the causation or pathology from these statistics?

A careful examination of patients teaches that there is the closest

resemblance between the paralytic and non-paralytic, at any rate in mental symptoms. We find in the former such delusions as these: "Believes himself given over to the devil," "thinks poison is put in his food," "believes he has committed sins too enormous to be forgiven", "thinks he is going to be arrested." On the other hand we meet with very exalted ideas, delusions of wealth and grandeur, and the assumption of titles and honors in patients who are not paralytic, in women as well as men.

What is there in the condition of the women of the upper classes which should exempt them from a disease which appears in those of the lower classes? It may be urged that among the latter the effects of alcohol and syphilis are potent. But alcoholism is not so very uncommon among ladies, and most medical men have seen its results in the shape of paralysis and dementia but not general paralysis of the insane. Syphilis is certainly common among women of the lower class; so common indeed is it that if it were a frequent cause of general paralysis, the number of female general paralytics ought to be far larger than it is. Those who have the treatment of syphilitic women do not speak of the disorder as being a frequent result of the syphilis, and it is manifest that the latter can only be one factor in the causation of it.

There is one point in which the mental symptoms of the general paralytic differ from those of the ordinary maniac, however exalted the latter may be. We notice the commencement of the dementia which is in the end to obliterate all the mental faculties. This is visible in the paralytic from the very beginning and is not seen in the maniac; and almost as early the physical symptom of unequal pupils or a slight stutter may be manifest. Why the prognosis is so uniformly unfavorable in all these cases is because this commencing dementia and the physical defect of speech or pupils mark not merely a functional but an organic change which is taking place in the highest centres of the brain, a change which is progressive, and though it may advance slowly with pauses and remissions, yet nevertheless is not to be arrested by means known to us, and terminates not only mind but life within a few years.

As to the nature and seat of the primary disorder opinions still differ, and the difficulty of determining the one or the other is shown by the voluminous writings on the subject. The examination of the morbid anatomy is not conclusive for the reason that it reveals to us the results of long-standing and progressive degeneration—degeneration which causes the lesions to resemble those of other diseases, and has even induced observers to imagine that senile dementia and general paralysis are one and the same malady.

The first symptoms, mental and physical, point to a disease which has attacked the highest structures of the cortex, the nerve cells and fibres. And from the first it would appear that this is an attack affecting the life of the part and not a mere functional disturbance. That it is of the nature of an inflammation seems to be proved by the rise in temperature, the evident hyperæmia and hyperaction in the early stage, and the appearances after death, so the name claimed for it by many is a *cortical encephalitis*. Why this should attack the brains of some and not of others, the brains of men in the prime and vigor of life, while it passes over those of the young and old and the majority of women, it is at present difficult to say. Not more difficult, however, than the question why one person develops cancer in a family whose history shows no trace of hereditary taint, while in another there may be a tumor of the most innocent kind. All that we can say is that given the sex and age in which it is most frequently seen, a brain predisposed by syphilis or alcohol, by overwork or overworry, instead of being functionally upset for a time, contracts this which may well be termed the malignant disease of the insane and at once loses the life of some portion, perhaps a small one, of its enormous congeries of cells and fibres, and undergoes a change which renders it incapable of ever again being perfectly restored, though it may be repaired to a considerable extent.

I am supported in the view that the nerve cells and fibres are the first attacked in general paralysis by Dr. Mickle, who in a recent article[57] writes: "Some time before I first knew of Tuczek's results I held the view that in some cases at least of general paralysis the nerve-cell-and-fibre apparatus of the brain probably suffers earliest, and I maintained this view in a paper read at the annual meeting of the British Medical Association in 1883, and reproduced some of the conclusions drawn therein in my work on 'General Paralysis,' from which the following extracts are taken." "If we inquire where the starting-point of the change is in general paralysis, our histological investigations would, on the whole, refer us to the vessels and interstitial tissue, or at least intercellular elements. Nevertheless it may well be that the starting-point of the trouble is often in the ganglionic nerve cells, and that the excessive overstrain and morbid stimulation or irritation by which the nerve-cells are brought into a state of damage, injury, and lowered vitality superinduces an active afflux of blood. An equal degree of departure from a healthy condition existing in nerve cell, in vessel, and in intercellular substance, the last two would give vastly more obvious histological indications of it than the first would.

"On the whole, we may view general paralysis as essentially com-

mencing with hyperæmia and ending with chronic cortical degenerative cerebritis and, usually, embryonic and connective-tissue substitution, the change, fundamentally parenchymatous, affecting all the elements of the part; but usually, under the methods of examination hitherto chiefly in use, presenting a more obvious and more marked affection of the blood-vessel walls and interstitial elements. The cerebral, or even encephalic, are almost invariably associated with lesions of other parts of the cerebrospinal nervous system, and the morbid action begins exceptionally in parts other than the cortex cerebri. Obviously this view allows of several varieties of general paralysis."

Upon the number of varieties into which we may divide the cases of general paralysis much difference of opinion exists. The course of the disease varies much. In some there is from the first and throughout great excitement and exaltation which soon wear out the patient and bring about rapid death. In others there is quiet dementia with scarcely any excitement or grandeur, and these last a longer time. Others are throughout depressed and melancholic. It is doubtful, however, whether these cases, though they differ much, can be grouped into special varieties, for they all have many characteristics in common. There are some which require notice, in which spinal symptoms exist before the cerebral. I have known several who apparently suffered from ordinary locomotor ataxia for a year or two with their faculties unharmed, and then the usual symptoms of general paralysis supervened and ran the ordinary course. What is the connection between the ataxic and the cerebral disorder? Some think that there is an extension of the spinal lesion to the cerebrum, due to "an ascending change—*i.e.*, to propagation by direct continuity of diseased tissue—thus making a system disease of the spinal cord the originating factor of the subsequent cortical lesions of general paralysis."[58] From this view Bevan Lewis dissents, as he has failed to find direct continuity of changes in the spinal cord and brain, and is of opinion that we are "apt to overlook the transfer of disease to distant parts of the nervous system through implication of higher realms, not by direct continuity of diseased tissue, but through the vasomotor agency operative upon nervous tracts in physiological sympathy with their higher centres." "In the large majority of cases of general paralysis the patient passes through the various stages of the disease without any notable spinal symptoms apart from those due to implication of the bulbar nerve nuclei, until the last epoch of the affection is reached; while in others, from the very outset the spinal symptoms are the most prominent feature of the case. In other cases, again, the spinal symptoms appear to bear a definite relation to the various

stages of cerebral disturbance and vary in their nature *pari passu* with the latter."

Bevan Lewis[59] groups the cases commonly met with into four divisions.

"1. In the majority of cases we have as the only evidence of spinal implication a somewhat general diminution of cutaneous sensibility associated with a sluggish or greatly diminished knee-jerk; alternatting later on with (or supplanted by) increased knee-jerk, usually as the direct sequel of a convulsive or apoplectiform seizure. Later on in the disease paretic symptoms may predominate and contractions be established; but these follow in the wake of pronounced cerebral disturbances (convulsions, etc.) and appear in fact to be initiated thereby, while the cerebral implication throughout has been all along the more emphasized.

"2. Here there is a second group comprising from the very onset notable tabetic symptoms, the cerebral often so greatly in abeyance as to arouse the doubt whether we are not here engaged with a genuine *tabes dorsalis* of local spinal origin. The disturbance of sensation, the abolition of the deep reflexes, the ataxic gait, are all so prominent that we are apt to attribute such symptoms to a primary implication of the cord itself. And yet in this tabetic form of general paralysis we usually witness complete subsidence of the special spinal symptoms, the tabetic gait passes off, the knee-jerk returns, and then the full development of the cerebral symptoms is established; or what is not infrequent, the sensory implication of the cord becomes a motory affection and spastic paraplegia replaces the anæsthesia and ataxia.

"3. In yet another series of cases, the motor spinal anomalies are from the first a most notable feature; and symptoms indicating a symmetrical descending sclerosis of the lateral columns are early apparent, usually as the sequel of convulsive seizures, a mode of implication which appears to be of special frequency in general paralysis affecting those who have been addicted to alcoholic indulgence.

"4. Lastly, there are those cases where no spinal symptoms whatever are noticed, the derangements being cerebral throughout."

Morbid Anatomy.

Almost every part of the brain structure has been looked upon as the seat of the disease. Some have thought it a chronic meningitis, many more have looked upon it as an inflammation of the cortex, while by others the morbid change is thought to be an increase of the connective tissue, invading both the grey and white cerebral substance. Then again it has been thought to depend upon disease of

the blood-vessels, and Bevan Lewis is of opinion tha the earliest lesions are witnessed in the vessels of the pia mater. The difficulty arises from the fact that the vast majority of general paralytics do not die at the commencement of the disorder, and those who are competent to examine the morbid anatomy and are familiar with the disease do not see the patients till they are admitted into asylums, probably when some time has elapsed since the first symptoms were noticed. With rare exceptions life is prolonged for some months or even years, so that all that is seen is the result of long-standing degenerative disease.

When we open the head of a general paralytic we find the cranium often much thickened and the dura mater adherent. This too is thickened, as are the walls and sheaths of its vessels, and on its inner surface are frequently seen layers of thin, hemorrhagic, pseudomembranous exudation, or recent blood or clot, the residua of a great afflux of blood. The arachnoid is milky and thickened and studded with Pacchionian bodies, which may unite it to the dura mater or even excavate hollows in the skull. The pia mater is generally thickened, coarse, tough, and bathed in serum, except where it is adherent to the cortex. These adhesions are found in almost every advanced case, and when we remove the pia we tear up the superficial layers of the grey cortex from the summits of the gyri, and occasionally also from the declivities. This appearance is chiefly noticed in the frontal and parietal regions, and the whole or nearly the whole depth of the cortex may come away. The white substance is usually discolored and may be softer or firmer than it is normally. There are very often in advanced cases atrophy and diminution of the whole cortex and a great increase of fluid in the ventricles and other spaces. The ventricles also, and especially the fourth, present an appearance of pearly granules.

The pons and medulla oblongata are, according to Dr. Mickle, often atrophied and softened, less frequently indurated; their meninges are frequently thick and adherent.

Bevan Lewis speaks of three stages in the morbid evolution of general paralysis. The first is that of inflammatory engorgement and it is in the vessels of the pia mater that lesions are earliest witnessed, the lymphatic sheath being that in which the inflammatory change originates. Cases proving fatal at an early stage may exhibit to the naked eye no evidence of disease beyond a slight general cloudiness of the arachnoid along the course of the vessels in the frontoparietal regions and a very slight increase in toughness. The membranes may be rather more difficult of removal than in health, but there are no adhesions. Yet by the microscope may be seen an increase of the

nucleated protoplasmic cells of the adventitia of the vessels of the pia which are large, distended, and often tortuous. There is also a slight proliferation of the most superficial flask-shaped cells of the peripheral zone of the cortex and the vessels of the intima pia resting upon it. From these cells long processes extend deeply down into this layer. These changes undoubtedly commence in the vascular supply of the pia-arachnoid, gradually extend into the cortex, and eventually penetrate its deepest layers.

In the next place, the soft membranes become far more gravely implicated. There is a free exudation from the distended vessels into the meshes of the pia, and beautifully disposed meshworks of connective fibrils permeate the subarachnoid space. The membranes then become waterlogged and atrophy of the cortical layers commences. This is more marked in the sulci than over the summits of the gyri, the area of the cortical surface involved in the one case being far greater than in the other, and in consequence thereof the gyri become narrowed and attenuated.

The vessels in the pia mater lose the normal support received from the opposed gyri, and as more effusion occurs to fill up the space left by the receding brain, the natural support of their walls becomes lessened, and in the diseased state of their parietes there is a strong tendency to hemorrhagic transudation or actual rupture and hemorrhage. Thus blood may be transfused into the subarachnoid space or between the pia and cortex, or the delicate and perforated arachnoid may permit an extravasation on to its outer surface, so that the subdural space may thus become the site of a hemorrhage varying from a mere delicate film of blood or a simple rusty staining of the arachnoid surface, to a thick coagulum of blood extending over the greater part of one or both hemispheres. The coagulum may be completely encysted within a firm fibrinous investment. These encysted hemorrhages, which are not peculiar to general paralysis, appear to be due to an initial extravasation caused by the rupture of a diseased vessel in the pia-arachnoid, and to the subsequent rupture of newly formed vessels within the organizing clot. In none of these cases does it appear to have a direct inflammatory origin in the membranes. Similar conditions are also found within the cortex itself. The blood-vessels lose the normal support given them by the perivascular walls, and in atrophy of the cortex these perivascular canals become enormously enlarged and filled with exudate from the contained vessels; this distention of the perivascular canals favors the aneurysmal dilatations so often found, and the eventual rupture or transudation of the contents of the vessels into the neighboring tissue. Adhesions are constantly found, the pia mater is bound down to the cortex, so

that the removal of the former tears away the latter. Such appearances are chiefly noticed in the frontal and parietal regions, and the morbid adhesions in general paralysis are almost strictly limited to the summits of the gyri. The reason for this is the natural subsidence of compensatory fluid into the sulci, and the much greater recession of the atrophied cortex allowed for by the special position of the walls of the gyri is unfavorable to the formation of adhesions. On the summits of the gyri the pia-arachnoid is in close contact and does not permit of the accumulation of serosity to nearly the same extent as the sulci. As the inflammatory state of the lymphatic sheath of the vessels extends to the deeper layers of the cortex, other grave disturbances necessarily ensue. Thus we arrive at the *second stage.*

The implication of the perivascular lymph channels by the production of protoplasmic masses on their walls, and the blocking of these channels and impairment of the vascular tissues directly affect the nutrition of the nerve cells; a granular change ensues and fuscous degeneration leads to their breaking down into a fine molecular mass of débris. The lymph channels are not able to remove this, so the supplementary lymph connective element comes into play. The spider-like cells, or Deiter's cells, as they have been termed, rapidly increase in size and number, forming large amœboid masses of protoplasm which apply themselves to all the degenerative elements around, and by a process of intussusception remove such particles into their interior. They become the phagocytes or scavengers of the tissue, live, thrive, and multiply upon the degenerating masses of nerve cells and their extensions, and all effete material lying in their neighborhood is ultimately appropriated to their use. They are also destructive of the living tissues; they affix their sucker-like processes to any portion of the structure, and occasionally several of these active elements are seen completely covering a large nerve cell, which is in an advanced stage of decay or scarcely visible, forming a mere pigmented molecular groundwork. They are usually noted in great abundance in the deeper half of the peripheral or outer layer of the cortex, and, being unmixed with nerve cells, are here peculiarly clear and defined. Their destructive agency affects the medullated nerve fibres, which run parallel to the surface of the cortex as continuations of the apical processes of the cells of the lowest layers. These then are the first structures involved, and the apical processes of the pyramids are the first to undergo degenerative change.

In the *third stage* we find these cells throwing out innumerable fine processes, and a substitution of a felt-like mass of fibrillar connective tissue formed out of the effete material afforded by the atrophied nerve tissue. This does not seem to be a compression from sclerous

invasion, but the presence of the sclerous element is explained by its production out of already degenerated nerve elements.[60] Whether the disease commences according to Bevan Lewis in the vessels or in the nerve-cells as Mickle holds, is a question which still awaits solution.

Treatment.

The treatment of general paralysis depends so entirely on the prognosis and diagnosis that when the latter is unfavorable our hope of recovery fades away, and all that concerns us is the taking care of the patient for the brief remainder of his life. Yet the close similarity between this disease and ordinary mania, and the resemblances in delusions and ideas should lead us to hope that some day a cure may be found, especially as even now the remissions and apparent recoveries point to so great an improvement in the individual as to make us think that there can be but little of the malady left. Our aim, if we cannot cure, must be to bring about such a remission as may enable the relatives to have the sufferer once more among them, and to keep him at home during the remaining days of his decline. General paralytics may be divided into two classes: those in whom dementia commences at a very early period, who being quiet and easy-going by their nature are readily managed by their friends with the assistance of attendants, and those who when thwarted or restrained are subject to paroxysms of blind imbecile fury and violence which render them very dangerous and necessitate the appliances and skilled officers of an asylum. They require safe rooms with guarded windows, doors, and stairs, and must take their exercise within protected grounds, for they are not fit to walk in public thoroughfares. Happily they are so elated by the nature of the disease that they do not feel the restraint like others, and though they protest and declare that it is a shame that they should be in such a place, they will at the same time be in a state of boisterous hilarity and never even ask to be released. No patients so enjoy themselves in an asylum, or are so easily pleased and humored; a promise that what they want shall come some day turns aside their present ill-temper and the failing memory causes them quickly to forget the desire and the promise. Though they are childish, and can like children be easily led by tact and kindness, they are at the same time treacherous and dangerous. Regardless of consequences, they will make foolish and hazardous attempts to escape, will try and set fire to a room, or secrete a stone or the like to attack the object of a delusion. They are not to be trusted, they will take up sudden and unfounded dislikes to those about them and will use violence if not carefully watched.

In the violent excitement so often met with at the commencement of the second stage much may be done by medicines, the most useful being digitalis and bromide of potassium. With the latter chloral hydrate may be combined in order to procure sleep if it is deficient. General paralytics do not, however, go day after day without sleep like patients in acute delirious mania. Digitalis is often of signal service in doses of ℥xv. to ℥xxx. of the tincture. Repeated, if necessary, every three or four hours, it often produces a wonderful effect, soothing the patients' turbulence and restoring them to a state of comparative rationality so that they cease their destructive habits and filthy ways, wear clothes in decent fashion and take food. Opium and morphine are useful in some cases and may be tried with or without digitalis. Physostigmine and veratrum viride have also been recommended. Very good results, it is said, have followed the use of counter-irritation by blisters, cauteries, or setons applied to the nape, spine, or scalp, especially tartar-emetic ointments to the shaven vertex, suppuration being subsequently maintained, or linimentum iodi applied to successive halves of the spine.[61] When fits are occurring or threatening, chloral and bromide of potassium should be given, or chloral may be administered by the rectum, or chloroform may be inhaled. In the old days the perchloride of mercury was used in almost every case because it was held that the disease was an inflammation, and for inflammation mercury was the remedy. Nowadays it is given because syphilis is thought to be the cause of the majority of cases of general paralysis, and even if there is no history and no sign or sequela of the disease, antisyphilitic treatment is recommended on the chance of there being somewhere in the system this virus lurking. Patients are brought to asylums soaked in iodide of potassium and salivated with mercury. I have seen some rapidly sink under this treatment, unable to take food owing to the state of the mouth and debilitated by the too vigorous drugging. But I never saw a patient cured of general paralysis by antisyphilitic treatment.

After the excitement has passed away, to be followed either by a remission and return of quiet and rationality, or by mental and bodily weakness, our efforts must be directed to maintaning the strength and defending the patient from everything that can do him harm. Those who are most rational and think themselves perfectly well are better away from home, and from all that reminds them of their former life and tempts them to return to former occupations. They are better away from their wives, though this is not always easy to effect. Sexual excess, or what is excess to them, is certain to cause a breakdown, and those are better off in whom the disease has annihilated desire. Another great enemy of these patients is cold; they are

greatly affected by it and should be kept in as much warmth as possible. If they are too feeble to walk fast they should remain indoors, for driving in cold weather is certain to chill them, no matter what amount of furs they have on. They require a liberal diet and generous supply of wine. There is a tendency to fatness at one period, and it is a bad sign when this passes away and emaciation sets in. The stage of dementia and declining strength calls for the very best nursing, for such patients will be wet and dirty, and often the greatest care will not prevent this at night. They must not lie in bed night and day; when thoroughly cleansed and washed they should sit by day in an easy-chair, thus varying the pressure, for that which is most to be dreaded is bedsores. So low is the vitality that in spite of all we can do bedsores will occasionally form, but they may often be kept at bay by judicious treatment. The back and buttocks should be examined daily and well washed with soap. Any places that look red should be dabbed with spirit or a strong solution of sulphate of zinc. Some patients who are very torpid will wear a urinal or allow one of earthenware to remain between the legs during the night, but these are the few. Anything that will keep the back dry or prevent the urine from reaching a bedsore already formed is of immense advantage.

Insanity without Delusion.

The patients which have now to be considered will come before us for an opinion as to their legal position, and this must be decided first of all, the treatment depending mainly upon it. Those afflicted with mania, melancholia, or general paralysis present plain and unmistakable symptoms of insanity; they require treatment; about the insanity there is no doubt. But others we have to examine to decide whether they are or are not legally of unsound mind so as to be incapable of taking care of themselves and their affairs. And to this after due consideration and perhaps many examinations we may testify in the witness box of a court of law, or may be called upon at short notice and in an urgent case after brief consideration to give a certificate of insanity for the purpose of placing a person under restraint. We may also be asked for an opinion as to the legal responsibility of one who has committed a crime, or entered into a contract such as marriage, or may be requested to attest a will and so vouch for the testamentary capacity of the testator, or give evidence in case of a dispute after his death. When in courts of law we hear counsel discussing insanity, and quoting from reports the dicta of eminent judges and lawyers, it must often strike us that they approach the subject from a different point of view from ours. Ours is based upon

observations derived from daily intercourse with, and examination of, insane people; the lawyer looks to the authorities, the legal dicta on the subject, and as time changes men's views, and as the view of one eminent man may differ from that of another equally eminent, and as all these opinions are enunciated upon some one special occasion, and not upon insanity in general, it follows that great confusion exists in the legal mind.

"The two great divisions of mental disease, namely, 'dementia' (or 'idiocy') on the one hand, and 'insanity' (or 'lunacy') on the other, may be taken to be those which are at present in substance and in some form almost universally recognized. Though not identical in name, they are founded on the same basis and accordingly find a place both in medicine and in the English legal system. But at this point medicine and English law at present part company. Medicine, regarding insanity as a mental state resulting from disease of the brain, looks at the mind as a whole, and accordingly considers unsoundness in any one part or faculty of it as likely to render the entire mind unsound. But English law, on the other hand, to some extent at any rate, recognizes what is called a 'partial insanity.' The phrase 'partial insanity' sometimes means an insanity which is only partial as regards time, and exists at one moment and not at another; and when used in this sense it is better described as 'intermittent insanity'; at other times the expression 'partial insanity' is used to denote an insanity which the law supposes to be confined to one subject, and to the set of ideas connected with this one subject; or, in other words, to affect only one particular portion or compartment (as it were) of the mind, which is treated as being made up of several distinct parts." [62] This partial insanity of the lawyers is what we term monomania or insanity with delusions. It used to be called melancholia, and the criterion of it was the absence or presence of delusion. Sir John Nicholl, in the celebrated case of Dew *vs.* Clark, said: "I look upon delusion in this sense of it, and insanity to be almost if not altogether convertible terms. In the absence of anything in the nature of delusion, the supposed lunatic is in my judgment not properly or essentially insane."

Lawyers in the present day cling to this doctrine, and argue that a man who is utterly demented, whose memory is so destroyed that he does not know his own children by sight, or is unable to tell us what he was doing ten minutes ago is not insane because he has no delusions. But those who have experience of mental disorders know that there are many whose minds are so unsound that they cannot take care of themselves, yet present no delusions; of such unsoundness there are various forms.

Moral Insanity.

This term, which has been the subject of much controversy, was applied by Prichard in 1835 to an insanity which he says "exists sometimes with an apparently unimpaired state of the intellectual faculties," and he defines it as "madness consisting in a morbid perversion of the natural feelings, affections, inclinations, temper, habits, moral dispositions, and natural impulses, without any remarkable disorder or defect of the intellect, or knowing and reasoning faculties, and particularly without any insane illusion or hallucination."

Here, it will be observed, Prichard contrasts moral and intellectual insanity, morality and intellect. But morality is not a division of mind. We read and speak of the senses and the intellect, the emotions and the will, as component elements of the mind, but morality or ethics is something beyond these and evolved out of them. By morality we mean the principles of right and wrong by which men of different races, high or low, regulate their behavior for the preservation of self, or for the rearing and maintenance of offspring, doing all not to the detriment but the benefit of the other members of the society. Such conduct consists of the adjustment of acts to ends from the simplest to the most complex, whatever their special natures, and whether considered separately or in their totality.[63]

The evolution of conduct or morality follows the laws of the evolution of mind. The savage is higher than the brute, both in his self-maintaining and race-maintaining conduct. As the mind of man advances by evolution from that of the savage to that of a member of the highest civilized community, so do conduct and morality progress in furthering self-preservation, in fostering progeny, and in doing everything to promote the welfare of all fellow-men. This is what is meant by morality, not merely that which is the opposite of immorality in the secondary and technical sense of the latter word. According to the degree of evolution, so will be the complexity of the feelings and relations of feelings, the composition and ideas of relations of which mind consists. There cannot be highly complex ideal feeling without equally complex intelligence. The two coexist and the one is the correlative of the other.

If we trace the development of mind in the individual it is not difficult to observe the evolution of morality and conduct from childhood to manhood. The child learns to control its passions, desires, and temper, and knows that these must be subordinated to the wishes or commands of parents, or something unpleasant will follow. This conduct, at first simple and relating to but few things, becomes more

and more complex as years advance and the environment widens. Some there are who never learn the lesson, and remain constantly in opposition to those about them. Their entire life is one of misconduct, but of them I shall speak presently.

The development of conduct and morality may also be observed in societies, these ranging from the lowest savages to the highest civilized communities. The standard of conduct rises here as it does in the individual, the habits and customs of the lower races differing altogether from those of the higher. But the conduct, that is, the morality or moral sense of the highest communities is not the same in all the individuals. There is a certain number whom we call criminals for whom law, police, and prisons have to be maintained. For the prevention of crime and the elimination of this degraded and criminal class compulsory education and sanitary laws are required, and beyond this criminal class, but closely allied to it, are the insane whose moral sense is deficient or wholly absent, who have to be taken care of, either of the purposes of cure or because they are unable to live as ordinary members of the society to which they belong. These are of two kinds, those who having been for a time sane and healthy become through mental disorder altered men and women, and those who by reason of their defective development always lack the moral sense and remain in an undeveloped and childish condition through life.

The first division, those who having been sane become insane, presents fewer difficulties than the second, because we have a standard of conduct constituted not by society in general but by the individual himself, and with that we are able to compare his present state. The highest mental attainment which civilized man can reach is a right rule of conduct regulating the affairs of life with judgment, prudence, and restraint; consequently we may expect that any defect of mind will make itself evident first in this quarter. The higher centres of the brain and mind will be "reduced," and there will be an overaction of lower centres from the removal of the control of the higher. Applying this to conduct we find that the reduced brain gives way to the gratification of the senses regardless of consequences, permits indulgences in pleasure to the detriment of self or family, or sets at defiance the conventional laws of society or even the law of the land. The patient is reduced to the level of a child or an uneducated person, and the reduction may be so great as to bring him to the condition of an uncivilized savage. An insanity of conduct and morality is often witnessed, not as a special variety but as the result of any cause which affects injuriously the brain function.

All competent observers of the insane are agreed that in a certain

number intellectual defect is not the first or the most marked symptom. A man may possess a perfect memory, may be able to converse brilliantly, argue cogently upon many questions, may present no delusion or hallucination, and yet be a changed and altered man. His conduct is different from what it was formerly. He may not be immoral, and yet his morality or ethics is altered, and altered for the worse. His feelings and affections towards his wife and family are estranged. He is extravagant or penurious; his mode of life is altered, he neglects his person, is uncleanly, associates with people beneath him in station and habits, or takes up with amusements which formerly he would have condemned. Although so changed in feelings and habits, he may still betray to a stranger no defect and no delusion. In such a man some may say that they can discover no intellectual defect. But what do we mean by intellectual defect if a man justifies or laughs at conduct which is entirely foreign to his former life, or the life of those in the same rank of society—conduct which involves the squandering of his property, the impoverishing of his family, and the ruin of his health? The loss of all prudence, judgment, and restraint implies the degradation of his intellectual as well as his emotional centres, and to say that his intellect is sound seems to be nothing else than a quibble about words.

There are several classes into which such patients can be divided. There are some whose insanity throughout may be called moral insanity; they are changed and altered men, do extravagant acts, sometimes consort with loose women, often drink more than is good for them, are restless, sleeping little and rising early, and spending the day in an incessant round of foolish undertakings, often to the detriment of themselves or their families. It does not follow that all are immoral. Many are not, but they are all changed and altered not in the direction of depression but the reverse. If they were depressed, we should say they were melancholic, and if the melancholy were slight, we should call it simple melancholia, there being no delusions but only gloomy feelings. The moral insanity which we are considering is the exact obverse and counterpart of this, and we may call it simple mania. There are no delusions in the ordinary sense of the word, but the patient justifies and defends all that he does or wishes to do, often with considerable acuteness, and cannot be persuaded of his folly by the arguments or remonstrances of his dearest friends. We get excellent examples of this moral insanity in those who suffer from *folie circulaire*. When the gloom passes away and the cloud lifts, the patient feels a new man. A stream of fresh life courses through his veins and his conduct is shaped accordingly. The depression may not have been sufficient to cause him to be placed under

legal restraint, for in that state a man is often docile, passive, and easily managed. And frequently it is extremely difficult to sign a certificate for one in the opposite condition if there are no delusions, and if the conduct is marked only by acts of immorality or too great indulgence in drink. I had under observation for many years a gentleman who alternated between gloom and excitability, each lasting for a twelvemonth or more, never attaining a height which called for legal interference, but being a constant source of anxiety to his family and friends. In his extravagant state he was not immoral and never drank, but he embarked in foolish enterprises and each one of these periods was marked by the speculation undertaken at the time. He went on thus through life and died at an advanced age of ordinary bodily disease without anything like dementia. He came of a family in which there was much insanity. Of his father I shall speak presently; his brother had many attacks of mania and died in an asylum, and a sister tried to commit suicide.

This man never drank; in his hilarious state he may have taken more wine than usual but was never intoxicated. But we have excellent examples of moral insanity in those whose chief symptom is an uncontrollable craving for stimulants, alcohol, opium, coca, chloral, or the like. I have already (page 95) spoken of the various kinds of drinkers, the habitual drunkard, the true dipsomaniac, and those who have been called *pseudodipsomaniacs*, the latter being the patients who most deserve the name of the "morally insane." The disorder is constant and chronic, unlike the true dipsomania which is periodic and recurrent, with an interval of abstinence and sanity. These morally insane people if kept by force and restraint from drink will go on well and appear to be of sound mind, but the desire is ever present. They never miss an opportunity of getting stimulants and will resort to any fraud, stratagem, or device to obtain that which they so dearly love. In their sober moments they promise anything and will even take the pledge, but they have neither the will nor the intention to keep it. Their minds are weak and unsound and all honor and honesty are obliterated. Such people will ruin themselves and families, neither remonstrances on the one hand nor promises on the other averting their downward career, and for many there is no cure. Yet they may present no delusions and the intellect to the superficial observer is unimpaired.

The patients whose conduct alone indicates insanity are comparatively few. Far more numerous are they who at the commencement of an attack are altered in habits and feelings as well as conduct, yet have not as yet reached the stage of delusion. There is a period of this kind in almost every case of insanity, and many, as we have seen,

commence by depression. This is in itself an alteration, but the patient may be manageable and his conduct correct, and so the friends are not alarmed; but the depression drifts away and symptoms of excitement appear, and this may go on to mania with all kinds of delusions or hallucinations. Yet before these are reached we may have to do with a stage of altered conduct which may be difficult to deal with as legal *insanity*, and yet is undoubtedly morbid. The best proof of its being so is the fact that it is entirely an alteration and foreign to the nature and habits of the man when he was well. But it is difficult to rely upon this when we do not happen to have known the patient previously, for friends will exaggerate the change and he will deny it, and the conduct though strange may not be so outrageous as in itself to prove insanity. In many cases time comes to the assistance of our diagnosis, and conduct which is open to question this week may in another leave no doubt in the mind of any one, the mental disorder having made a considerable advance in that time. Where we have reason to think that this will occur, it is well to wait; but we should give orders that the patient should be watched as closely as possible. If he is not depressed, he is not likely to commit suicide or homicide; and if he creates a disturbance and falls into the hands of the police, this may materially assist the friends in their efforts to restrain him.

The stage of moral insanity is one on the way to mania with delusions. It is also not unfrequently a stage on the way to that much more serious malady, general paralysis. In the state of alteration which is frequently described as the first noticed in this disease, all kinds of foolish conduct may be seen. It not unfrequently happens that people are brought before magistrates charged with theft who are in this early stage of the disease, and it is not always easy to be certain of our diagnosis, or to persuade officials that a man apparently sane and in good health is really insane and has not long to live. A case of this kind came before me not long ago in which a gentleman in a public office had committed acts of theft for which he had been summarily dismissed. On careful examination we found, first a great loss of memory; he did not know how or when he had possessed himself of the articles in question, did not even know that he had them till they turned up in his room. He had taken various things not only in the office but from houses and clubs, but had no recollection of the acts, and said that he had had for some time an irresistible desire to purloin. He had been in a railway accident some two years before, and had been treated for syphilis for many years, the secondary symptoms having frequently returned. His walk was peculiar, especially when coming downstairs, and with his eyes shut he was

unsteady; his knee-jerk was exaggerated. There was sexual desire but at the same time impotence. His want of responsibility was established to the satisfaction of the superiors in his office. Where acts of theft are committed without an adequate motive, especially where the articles stolen are of little value compared with the position in society of the delinquent, the presence of general paralysis should be closely looked for, if he is one who might be the subject of that disease.

The state of altered conduct which is termed moral insanity may be a result of an epileptic attack or attacks. We know that every kind and variety of mental disturbance may follow epilepsy, great maniacal violence, insane impulses, or delusions. But when the fits are few or at long intervals, the feelings and conduct may be changed without any intellectual defect or delusion. Several cases of this kind have come before me in which an epileptic attack was the beginning of the trouble, this being followed by an alteration, and in one case by periodical fits of drinking. The occurrence of even one fit should make us closely watch the mental condition of the patient, and should prepare us for anything that may appear strange in conduct. Many patients, if they are single men or women, may have occasional fits in the night which neither they nor their friends know anything about, for they may not be severe enough to cause the tongue to be bitten or the urine to be evacuated. Some also may have the sensations of *petit mal* for a long time before they are recognized, the patients and their friends looking upon them as slight feelings of faintness. Yet the effect may be to reduce the brain centres to some extent, and so bring about that alteration in the individual which is manifested in eccentric or insane conduct.

The same alteration is not unfrequently seen in the aged. It may be very gradual, so gradual that it is difficult to say when the commencement took place and may show itself in an increase of emotional excitability, in telling stories over and over again, in want of purpose and ability to make plans and keep them. All this is harmless and calls for no interference, but now and then it takes the form of misconduct and is very difficult to deal with. An old gentleman, the father of one I have already mentioned (page 185), whom I knew well as the pattern of domestic virtue and paternal affection, in his latter days consorted with loose women of a very low class and wasted much money upon them. I do not think that any medical man could have signed a certificate of insanity, though the change was fully recognized by his family. Failing health happily put a stop to his practices.

Far more frequent are the patients who have had attacks of acute

insanity, mania or melancholia, and have recovered to a certain point but not entirely. In the present day when an outcry is raised whenever patients are placed in asylums, there is a tendency on the part of all physicians and friends to liberate at an early period of the convalescence those who have lost the more marked features of the disease. In many cases the result justifies this procedure, and some recover permanently and entirely, even beyond our expectations. But some there are who do not quite recover, and in whom the mental disorder is shown to be still present by their changed or depraved conduct or alienation of feelings from those formerly held most dear. There may be no delusion or conduct markedly and unmistakably insane, and the difficulty of restraining them may be great. Not unfrequently habits of drinking are engendered and do much to complicate the diagnosis, and sometimes a very moderate amount of alcohol seriously affects those who have already had attacks of insanity, blows on the head, or epileptic fits. Probably most asylums present examples of patients who have recovered to a very great extent from the insanity; they have lost the delusions and hallucinations. They do not hear voices, are not homicidal, do not think they are persecuted or watched by the police, yet they are incapable of behaving like ordinary members of society and adjusting themselves to the environment. Male patients in this condition are very apt to take drink which soon brings about a crisis. Females are jealous of others; wives are jealous about their husbands and accuse them without a shadow of excuse. They quarrel with their nearest relatives, mothers or daughters, so that it is impossible to keep them at home, and yet they will utter their complaints and tell their story with so much plausibility that only those who live in the house with them can see how insane they are.

Besides these various morally insane patients, the commencing, the semi-recovered, the senile, the epileptic, or the general paralytic, there is an important and difficult class which gives rise to much controversy and forensic battles. These are the weak-minded or imbeciles, boys or girls, who from early life have been deficient, below the standard of their fellows, destitute of the ordinary capacity of mankind. Here we have no former standard of health by which to gauge them, for there is no alteration of character or conduct. From childhood most of them have been peculiar, unable to learn like others, to go to school and take their place by the side of others, and many of them are quite unable to distinguish right from wrong. So long as they remain children they may be taken care of by parents and guardians, but when they emerge from childhood and have to assume the responsibilities of men and women, they come before us in various

ways, and for legal purposes our opinion will be sought concerning their mental state. They are not to be called idiots, though they are but one grade higher; they are the result of an inherited neurotic defect, or of convulsions or fits in infancy or early life, or their brains have been damaged at the time of birth. In humble life these defective boys and girls will very likely develop vicious propensities and swell the ranks of the criminal classes; in a higher station of society they are the torment and difficulty of parents. They may display at an early age a tendency to immoral conduct of all kinds and a total disregard for truth; they steal in a way which they think clever, but is in reality silly, consequently no school or tutor will keep them. They may be told with the greatest care and in the most impressive manner that it is wrong to steal and wrong to lie. They will repeat what is said to them, and assure us that they know it is wrong, but they learn it as a lesson, and it all goes out of their head like a lesson in Roman history or the Latin grammar; the next day it is clean forgotten and they go back to their normal habit as before. These young people are brought to us either for treatment or for an opinion as to their unsoundness of mind. With regard to treatment it is to be remembered that a defective brain such as is here present is not to be renovated so that it will become a sound and perfect organ. We may prevent its becoming more degraded and sinking lower and lower, but it will remain damaged to the end. Before consulting us the parents will probably have tried schools and tutors. Such children can hardly be kept at home; especially if there are others; and home is a bad place, for it rarely happens that both parents are judicious in the management, and one is irritated and intemperate, while the other screens their faults, takes their part, and harms them by foolish kindness. If they remain at home they are handed over to servants or attendants, and this fosters their natural love of inferiors, and the next step is the low society of the village public house. If they are to leave home the question arises, Where are they to go? It is very difficult to place them with other children; they quarrel, steal from them, invent lies and accusations against them. They require the personal superintendence and care of educated people who are competent by temperament and love of the work to undertake the up-hill task of improving these blighted waifs of humanity. The first thing is to find out some taste or some capacity which the child possesses. As I have said, they are not idiots, and many are capable of doing some one thing and doing it well. If this can be discovered it should be developed; it may be music or carpentering or needlework. Anything that will give occupation and employ the mind and body for a certain number of hours daily should be encouraged. Other education should be regu-

lated by the capacity, for it is useless to torment a child with lessons which it is wholly unable to comprehend or profit by. The only effect is to engender a hostile feeling between the teacher and pupil which is very prejudicial to the latter.

The unsoundness of mind in these imbeciles being of a negative and not a positive character gives rise to endless legal disputes, whether the issue be one concerning property or crime. As they approach the age of twenty-one or even at a later period, it becomes a question whether they are able to take care of property and of themselves. What can we say about them in a court of law? They have no delusions, neither are they changed in conduct, habits, or demeanor. They are as they ever have been, stubborn, eccentric, spiteful, mischievous, often horribly cruel, vain, perfectly devoid of truth, incapable of being taught, but picking up in a desultory way many scraps of knowledge and holding them with a most tenacious memory. Fond, perhaps, of some amusement or occupation, they may carry this on for a time fairly well, but they have no endurance and give it up, being unable to adhere assiduously and constantly to one pursuit. Some of them, the girls especially, are not utterly wicked. They may be good and affectionate and give no trouble, but being equally weak-minded they require the protection of legal authority, being quite unable to understand or manage property and being at the mercy of any unprincipled person who would marry them for their money. How are these weak-minded to be tested? If their conduct is correct and there are no complaints on that score, we have to inform ourselves of their capacity to take care of themselves and their knowledge of the value of money. Many will be able to add up the coins we lay on the table and subtract one amount from another. They know the value of shillings and pence, and how much they ought to pay for the simple purchases they make; but beyond this they are unable to go. If we ask them about income, and especially their own, they know nothing, and are wholly ignorant of the meaning of five per cent. or three per cent., or interest on investments. And if we question them upon the expense of living, the rent of the house they inhabit, or the cost of the clothes they wear, we find that their knowledge is so limited that it would be impossible for them to go out into the world and take a house or lodging and shift for themselves. It will be said, on the other side, that girls are not taught anything about income or investments, that all such things are managed for them by guardians or legal advisers, and this is what they often plead themselves. We must test them beyond these topics by the ordinary standard of knowledge as found in an average girl of twenty-one in the same rank of life, and so we may arrive at a decision.

Where in addition to inability to learn we have a history of depravity of conduct, our difficulty may be that this misconduct comes to us wholly or chiefly by hearsay, and we do not see it ourselves, it not being carried on in our presence. We question them about it, and with the aptitude for lying which they all possess, they at once deny the truth of the accusation, or minimize and explain it away as a trifle or joke. Occasionally, when driven into a corner, they will admit it, allow it was wrong and promise amendment with the most solemn earnestness and vows. We may be able to pronounce an opinion not on account of the wickedness but the silliness and incapacity of such persons, and obtain for them the protection of the law which they so much need.

Our assistance may be sought not only for the protection of the property of the weak-minded, but also in cases of alleged crime in which the responsibility of the individual is the question. Stealing, fraud, and even forgery are committed by them not unfrequently and may come before a court of law. Many such acts are done clumsily and stupidly and themselves betray the incapacity, but it may be necessary for us to prove the latter by other evidence besides the act itself. This may not only be one of fraud or theft, it may even be one of homicide. Not long ago an act of homicide was committed by one of these youths who cut the throat of an "unfortunate" girl in the street. When I questioned him as to his motive I came to the conclusion that it was nothing more or less than a desire for notoriety. He had been reading the accounts of certain murders committed in Whitechapel by an unknown individual known as "Jack the Ripper," and he wished to rival him. An imitativeness is observed in many who wish to equal or outdo others of whose exploits they have heard or read. Stealing is very common, and with some ingenuity they will try to throw the blame on servants or others in the house. I lately saw a girl who had altered checks of her father's from £2 and £3 to £200 and £300, but few of the weak-minded are as audacious as this.

There is one more class in whom we shall find failure of mind without delusion; these are the patients whose minds from old age or disease have fallen into decay. They are not vicious in habits and do not require legal restraint, but being weak in mind are liable to become the victims of designing people, and to be taken possession of by such for the sake of their property, so a contest may arise out of such proceedings. The most constant defect is loss of memory, which will vary from a slight forgetfulness to complete obliteration, and vary a good deal at different times. The degree then will be the contested point; if it is extreme there can be no question as to the unsoundness of mind, for a person who cannot remember what he did

yesterday, or perhaps even an hour ago, cannot be said to have a sound and disposing mind when he has entirely forgotten the contents of the will he has made, or whether he has made one at all. All these patients can remember what happened long ago, what they did when boys and girls or young men and young women; so that by keeping them to these dates, it may be argued that their memory is good. But the events of yesterday or last week are gone. Often they cannot tell the address of the house they are in, how long they have been there, or what they did yesterday or the day before. These are the important points, and a patient with such defect cannot make a valid will or execute any other legal document.

Impulsive Insanity.

There is another class of insane patients in whom no delusions are to be found and whose intellect is according to some unimpaired. These are the people whose insanity is manifested rather by what they do than what they say, that which they do being usually an act of violence, often a crime, for which they are liable to be punished unless it can be proved that, being insane, they are irresponsible. To this variety of insanity has been applied the term *impulsive*, it being displayed chiefly in impulsive acts of violence, especially homicide, the impulse being often of a sudden and transitory nature, the mental tension being relieved by the committal of the act.

In many cases the crime itself is held, and rightly held, to be evidence of the insanity, so causeless and motiveless is its nature; yet this cannot be said of all, and therefore in courts of law "impulsive insanity without delusion" is looked upon with great suspicion by lawyers. In the majority of cases other evidence of insanity will be found, and we should study such acts as they proceed from the undoubtedly insane in order justly to appreciate the pathology of them. The violent or mischievous actions of the imperfectly developed have already been considered under the head of moral insanity as seen in the weak-minded, in whom there has been an arrest of mental evolution, the normal level never having been reached. And it has been shown that from the imitativeness which is peculiar to them even homicide may be committed. But this "impulsive" insanity is a result not of defective development, but of a reduction of the highest brain centres causing a want of control, manifested not in general insane conduct or foolish talk, but in explosive acts often apparently causeless and unaccountable, the impulse not being ever present but coming and going, as is sometimes the case with hallucinations and delusions.

It is of the utmost importance that these impulsive acts should be studied in asylums by those who have the care of the insane. They attract but little attention because they are of such common occurrence, and being very rarely completed homicides or suicides, do not demand special investigation. We do not inquire why a patient attacks another patient or attendant, tries to commit suicide, puts things in the fire, or tries to set the house on fire, smashes the windows or destroys the furniture and his clothes. We simply try to prevent his doing such things and take all precautions necessary for his safety. Doubtless some feeling, or possibly some idea, dominates the mind at the time which the higher centres fail to inhibit, but it may be very difficult to discover what the feeling or idea is or was. The patient may studiously conceal or be unable to describe it even if he would. It may be the outcome of a delusion, or a wish to escape by murdering the attendant and so getting his keys or setting the house on fire. On the other hand, it may be a feeling by which the sufferer is driven to explode in some muscular act akin to the explosion of epilepsy, an act which may be a mere smashing of glass or tearing of clothes, breaking of chairs or rushing with tremendous violence at some bystander. Of this feeling we are not told much, for it is difficult to describe, but it is a portion of a neurotic inheritance and may be witnessed in a less degree among women in prison, many of whom "break out" periodically in fits of violence and smashing without being able to account for it, only stating that they cannot help it.

Many authors have compared these sudden impulses to the sudden convulsions of epilepsy, and there is beyond question a great similarity between them. They occur at intervals and are sometimes periodical. Sometimes they are severe, overwhelming, and not to be resisted, and may be compared with the *grand mal* of epilepsy; at other times they are slight and the patient is able to withstand them, perhaps for many years, and they are analogous to the attacks of *petit mal* during which consciousness is hardly lost, or if at all, only for a few seconds. They resemble epilepsy also in this, that the accomplishment of the act gives relief and dissipates the morbid impulse, at any rate for a time.[64] And there is another point of resemblance. It not unfrequently happens that when some act of impulsive violence is committed, the patient has no recollection of any of the circumstances and is quite unaware that he has done anything violent or extraordinary. This is akin to the automatic condition noticed sometimes in epileptics, in which they may travel considerable distances, or do things which they never would have done if conscious, and yet do all in so apparently sane a way that those who see them at such a time

are quite unable to detect anything amiss. I knew a gentleman, an epileptic, who one evening was dining with friends at Richmond. He left the table during dinner, went to the railway station, took the train and returned to his hotel in London, gave up his ticket, paid his cab and did everything correctly and in order. When in his wife's room he woke and was surprised to find himself there, for he remembered nothing after his sitting down to dinner at Richmond. On another occasion something of the same kind happened to him at Brighton. If this man had had an impulse and attacked some one in the train or on his journey home, no one who saw him would have detected any insanity. There is a form of epilepsy to which writers, as Esquirol and Morel, have given the name of "masked" or "*larvée.*" It occurs in individuals who have had epileptic attacks, and instead of them paroxysms of violence and insane fury are manifested and appear to take the place of the ordinary epileptic attack; later on the latter may reappear. This cessation of the fits and the stage of insane impulse are closely akin to the interparoxysmal periods of automatic and unconscious action which have just been mentioned, and the occurrence of epilepsy, even at a remote period or in childhood, should be carefully investigated. That this insane impulse to kill really exists is sufficiently proved by the confession of those who have labored under it and have sought assistance and restraint to prevent the commission of the act. Such cases are on record; the patient has appeared to be sane in all respects, but has stated that when opportunity has been given the temptation to kill has been overpowering; a schoolmaster, for instance, amidst the sleeping boys, had an irresistible desire to strangle one of them. There is no doubt that a sudden temptation may cause the sudden impulse. I was called one day to a lady lately confined who had been left alone in a room with the infant; a sudden impulse seized her and she threw it out of the window. Fortunately, it fell in the garden and was not seriously hurt. She had been "odd" for some days, but there seemed to be no delusions or any apparent motive for the act.

Though genuine impulsive insanity undoubtedly exists when an insane desire to kill or to commit suicide is the only discoverable symptom of mental disorder, yet close investigation will often reveal other tokens of insanity or other motives for the homicide. It is very difficult to arrive at the real facts of the case. A part, such as delusions or hallucinations, must come from the individual himself, and these he may be unwilling to divulge; part we must hear from his friends, and they may tell us little, for some people can see no insanity in any one unless he is a raving maniac, while others will not acknowledge that they have noticed anything amiss, for fear they will be

blamed for not taking precautions for the safety of the patient or those about him. In the *Journal of Mental Science* (Vol. XXIX., page 387) we have recorded a case of homicidal impulse. A youth aged nineteen, who had always lived on the most affectionate terms with his mother, "in the morning ordered a present for her, took his meals as usual, and in the evening went to a young men's meeting connected with the church he attended, returning home about nine o'clock; had supper and read a religious book. He then said 'good-night,' kissed his mother and went off to bed. Shortly afterwards his mother went to her room. He lay down in bed but could not sleep. The awful impulse had seized him. In vain he tried to shake it off. He got out of bed, went down to the coal cellar, laid hold of the coal pick, and returned upstairs with it to his mother's room. The door creaked as he pushed it open and he hoped the noise would wake her, but alas! there was no such result, and in an instant the pick was buried in the sleeping woman's neck. A second and a third blow followed, one with the sharp and one with the blunt end of the hammer. Then he felt as though his brain were on fire." He wandered about the neighborhood for three days and then, having come to himself, as he expressed it, returned to his mother's house. When questioned about it several months later he said that for a year or more he had suffered from almost constant headache, and referred the pain to the parts corresponding to the longitudinal fissure. He said he tried his utmost to resist the impulse, but found it uncontrollable. After the act "something told him he had done wrong, and he felt as though his brain was on fire."

What was the previous history of this lad? He was always a most affectionate son and steady in his habits, but when twelve years of age his schoolmaster reports periodical fits of moroseness, at which times it was impossible to elicit answers to questions. Sometimes his conversation was rambling, incoherent, and vague, and he would break in with a remark not having the least bearing on the subject. At other times he was led away by an exuberance of spirits far from natural. After being for a time with a lawyer, he became a clerk in a merchant's office and went on well for some years. Then on March 24th, being sent with a parcel to the railway station, he went off without the slightest preparation from Northampton to Liverpool and stayed a fortnight. He could give no explanation of this freak, which seems to have been made in obedience to some unaccountable and sudden impulse. He then went back to his office work, which he performed satisfactorily and punctually, but his fellow-clerks noticed him staring vacantly out of the window, at other times absorbed in contemplation. He would knit his brows and grind his

teeth, or remain for hours without speaking. All these symptoms were more pronounced a few days before the assault, and a clerk remarked to a friend that "something ought to be done about Thomas." Nothing was done and the homicidal attempt followed. Fortunately it was not fatal. This appears to have been a well-marked case of homicidal impulse, but there was evidence of mental disorder having been noticed for a long time previous.

Dr. Clouston[65] gives a graphic account of a patient in Morningside, a medical man, who for a long time, even while engaged in busy practice, was haunted by an impulse to commit murder or suicide. "He had no insane delusions, he could reason well; affectively, he was fond of his wife and family and friends; he had not a cruel or criminal disposition—quite the reverse; he had no outward excitement, no signs of outward depression like an ordinary melancholic patient; his mind was not enfeebled, yet he wanted to kill his patients and his children and had much difficulty in restraining himself from so doing, and he actually could not restrain himself from suicidal acts." He had had a most arduous practice without any holiday and a very long illness. "Two years previous," he wrote when convalescent, "I had a fall on my head which stunned me at the time. I may say I never felt really well since the fall, though I did my practice. When in a train I was afraid I should jump out of the window, and when I saw one in motion I felt I must jump under it. I was afraid when applying nitrate of silver to the throats of my patients, that I should push it down. I was terrified to apply the midwifery forceps lest I should not be able to resist the impulse I had to drive them up through the patient's body. When opening abscesses I felt as if I must push the knife in as far as possible. When I sat down at my own table I used to have horrible impulses to cut my children's throats with the carving knife. At the sight of pins I had a feeling as if some had got into my throat. Whenever I saw a knife, razor, or gun I was afraid I should do harm by a sudden impulse, the will having hardly the power to resist. I took opium several times from no deliberate intention, but by a sudden impulse which I could not resist when I was working with it in the surgery, but I vomited it."

This man placed himself in Morningside of his own accord, recovered, returned to his hard practice and relapsed. His case is most instructive as observed in the calm of the asylum and not argued in the contest of a court of law.

It is not common, however, to find cases of genuine homicidal impulse, and many which at first sight appear to be of this character turn out to be those of delusion or persecution. Dr. Orange mentions a woman[66] who murdered her child and was acquitted on the

ground of insanity, the judge himself directing the verdict. The murder was looked upon as one of sudden and uncontrollable impulse, but Dr. Orange, under whose care she was at Broadmoor, tells us that the act was committed not from impulse but delusion. She did not want to live, and she remembered that she thought it would be a right thing to kill the children before she killed herself. She lay awake all night thinking it over, and when her husband in the morning asked her how she was, she said "Better," in order to induce him to go to his work and leave her; so little of sudden impulse was there.

Opportunity for the examination of a homicide is often very inadequate. It may be a hurried colloquy with a prisoner in a prison-room in the presence of prison officials. And in this country we labor under the disadvantage of being obliged to question the prisoner as to the commission of the act, which, strictly speaking, we have no business to do. The accused must first be found "guilty" or "not guilty" before the question of insanity arises. A singular case is within my knowledge. A gentleman, sorely tormented by "voices" and delusions of persecution, was sent by his friends to the Cape. The "voices" were so bad on board the vessel that he left it at Madeira, and then wandered about in many lands, flying from his persecutors, seeking rest but finding none. He returned to England and I was asked to see him, but before I could do so he left London and went into the country. Here his vague movements attracted attention; he was looked upon as a suspicious character, and two men, not police, took upon themselves to arrest him. Here at last his fears were realized and his persecutors had come, so he took out a revolver and shot one dead. At the trial he was acquitted not on the ground of insanity but on the facts, as it was proved that the men attacked him first without any justification; and the following day he was sent to an asylum, but not as a criminal lunatic.

I believe that more homicides are committed or attempted by those who hear "voices" than by any other insane persons, and that many of the cases of so-called morbid impulse may be explained in this way. For many such persons appear to be sane in every other respect, to fulfil the duties of life and to pass as sane even among their friends. The "voices" may not trouble them always; there will be periods of remission, and then if health declines or worry comes, they may return with great severity and order the sufferer to commit homicide or drive him to suicide. But all the time he may carefully conceal the fact that he is so tormented. A melancholic patient, too, like the woman mentioned by Dr. Orange, may kill some one else, as a child or children, because he or she is going to

commit suicide afterward, and does not wish to leave them behind, or may even murder some one in order to be hanged for so doing. Some also will commit the crime, or attempt it, in order to bring their grievance before the public, they having the delusion that they are defrauded in some way or other of their lawful rights. In all cases careful search and examination must be made. It may be necessary to see an accused person many times, to see a woman at various periods of the month, to observe such a one without his knowledge, in the night or at meals, and to see what he writes, if he can be got to write. We shall have to discover a motive for the act, if there be a motive, and the method of its performance, his preparations and present feelings with regard to it; to ascertain, so far as we can, the presence or absence of hereditary taint, his history as regards former attacks of insanity, epilepsy, inebriety, or blows on the head; to learn, either from personal inspection or reliable evidence, his conduct and demeanor after the committal up to the time of our examination, and to compare all that we see with what we hear.

This will apply equally to those whose impulse urges them not to homicide or suicide but to other acts as destructive smashing, stealing, popularly known as kleptomania, unnatural offences and the like. The whole history of the individual must be gone into, and if we have the opportunity of carefully examining it, we shall probably be able to decide whether the act is the outcome of insanity, violent temper, or a degraded mind.

Dr. Mickle has written[67] a very interesting paper on obsessions and besetments in which he points out that many are simple or absurd tricks, comparatively harmless, trivial, or incongruous. Such are the kinds which compel people to count all the gas jets or the trees, to retrace their steps and count over again, to walk on particular stones or touch certain objects. Such people cannot write a letter or do some similar act without doing some other trivial performance first. They do not stop here, however, but advance in many cases till the stage of insanity is reached and the obsession becomes a *possession* and rules the subject's life. From self-questioning and doubt are developed the various delusions of the melancholic, the fear of having done wrong, the dread of impending punishment with great anxiety and anguish. And not only are these gloomy feelings and delusions evolved, there are frequently *impulsive* acts compelled by the compulsive thought or compulsory feeling, acts which may be destructive or mischievous, theft, drinking, arson, murder, or suicide. And so we reach what has been termed *impulsive* insanity, developed from a stage which may at first have seemed unimportant and merely odd. Such apparently trivial obsessions in neurotic persons ought

never to be neglected. The acts will vary from the slight and trivial vagary to examples of self-killing and man-slaying.

THE TERMINATIONS OF INSANITY.

In the consideration of the terminations of insanity is involved the question of prognosis, a question of the greatest consequence, but one often difficult to answer, especially at the outset of an attack. We may refer to statistics, but almost the whole of these, it must be remembered, are derived from asylum cases and asylum treatment. When we are called to a recent case of insanity, one not complicated by general paralysis or epilepsy or other unfavorable symptom, we confidently pronounce a favorable prognosis if proper means are taken. We may have to tell the friends that to effect a cure, it is absolutely necessary to place the patient under restraint or in an asylum, and then frequently they declare that they will not consent to such a step. Our opinion will be gravely affected by such determination on the part of relatives, who are often the worst friends of a patient. In other cases our prognosis will be unfavorable. The malady has already become chronic and we are compelled to say that recovery is hopeless; or symptoms of general paralysis are so marked that there is no chance of any save temporary improvement. In all these incurable cases the probable duration of life is a matter often of great importance and we shall be closely questioned thereupon. In general paralysis the duration will be short; in apoplectic paralysis, though possibly longer, it will still be short, and paralytic epileptics do not, as a rule, attain old age. But chronic mania may exist for years. In every asylum we see aged inmates, especially women, who have been insane for perhaps forty or fifty years, and live their life to three- or fourscore years, dying of some ordinary disease as bronchitis or waning with age alone. Of such it may be said that the insanity has made no difference, that they have lived as long insane as they would have lived sane. In a small asylum for the upper classes I have under my care at the present time (December, 1896) 24 female patients. Of these, 4 are upwards of 80 years of age; one has been an inmate of the asylum 52 years, one 49 years, and another 24 years. Three are upwards of 70 years and they have been patients in the same house 50, 45, and 44 years.

The statistics of insanity are many in number, but they vary according to the mode of calculation, and owing to the difficulty of ascertaining the after-history of patients, they must in a great measure be imperfect. I know none more reliable than those of the late Dr. Thurnam, who, while at the York Retreat, had singular facilities for

tracing the subsequent history of the patients discharged, and among various tables he gives the following:

"Table showing the history of 244 persons who died at or after discharge from the York Retreat, from 1796 to 1840, with the number who died during and after recovery from the first or subsequent attack of mental disorder."

Cases followed through life.	Died insane during the first attack.	Recovered from the First Attack.				
		Total.	Recovery permanent. Died sane.	Had subsequent attacks.		
				Died sane.	Died insane.	Total.
Males, 113	55	58	21	6	31	37
Females, 131	58	73	24	14	35	49
Total, 244	113	131	45	20	66	86

These patients were all of the middle ranks of life, not poor and destitute, but well-to-do people, as the Friends generally are. Two hundred and forty-four become insane, and of these only 131, or 53.6 per cent., recover from the first attack; the rest never recover and die insane. But looking at the after-history of the 131, we find that only 45, or 18.4 of the whole, remain permanently sane. The rest are again insane, once or oftener, and of these only 20 die sane. "In round numbers, of 10 persons attacked by insanity, 5 recover, and 5 die sooner or later during the attack. Of the 5 who recover not more than 2 remain well during the rest of their lives, the other 3 sustain subsequent attacks during which at least 2 of them die." It may be said that these are statistics of a bygone age, that the period from 1796 to 1840 is not to be compared with the end of the nineteenth century. In some respects we may have advanced. Probably at the present time our various sedative drugs have reduced the mortality of cases of acute insanity, and there are fewer deaths from acute delirious mania and melancholia and more recoveries. But Dr. Thurnam's percentage of recoveries (53.6) is not a low one. The rate of recovery calculated on admissions in the asylums, hospitals, private asylums, and single houses in England and Wales during the ten years 1886–1895 was 39.28 per cent. Sir A. Mitchell's statistics of 1,297 patients, excluding readmissions, showed a recovery rate of 47.3.[68] "It must be remembered," says Dr. Hack Tuke,[69] "that there is very little general paralysis in Scotland, and therefore the above high rate of recovery cannot be expected in England and Wales." There is no reason for questioning Dr. Thurnam's statistics of relapses; as he was able to trace the after-history of every patient who had been at the Retreat in

whom death had occurred his conclusions possess especial value. His figures show the risk of relapse in patients who have had an attack, and bear out what I have said as to the marriage of any of them. It would be uncharitable, and not only so but unscientific, to look upon those who have once been insane as lunatics for the rest of their lives, yet when once a man or woman has been insane, no one can tell when he or she may not again become so. The relapse may not bring about permanent insanity. Like the first attack it may pass away, to be followed perhaps by a third or a fourth. These may follow some definite cause as a shock or worry or illness, for the changes and chances of life are not to be guarded against. But often a relapse may occur without any assignable cause by that periodicity which marks so much of human life and human disease, and though recovery may take place after many attacks, yet in many cases there comes a time when the patient's strength is not equal to the strain, and he dies or becomes permanently insane. And even though recovery may take place again and again under suitable conditions, yet these may be sometimes wanting, and the sufferer may through ignorance or want of care be exposed to great risk, or, before proper measures can be taken, may inflict injury on himself or others, or seriously damage his property.

Of the prognosis in the various forms of insanity I have spoken as I described them. Many are curable under proper treatment, but this is all important, and must greatly influence the opinion we give. The friends of patients are so unwilling to admit the existence of mental disorder that they will consult any medical man rather than an alienist, will engage the most inexperienced or incompetent attendant rather than one skilled in such cases, and will keep a patient at home or in unsuitable lodgings rather than send him to an institution where he can have open air and exercise in proper grounds. I have been told by friends that they would sooner see him die than take the latter step, and not a few have died in this way. Many after weeks or months of home treatment are brought at last to asylums on account of the expense or trouble, and then it is expected that they will recover in a few weeks because the friends were told, perhaps months before, that this would be the result of proper sequestration. In many cases the chance of recovery is past and gone, for if there is one thing in connection with insanity more certain than another, and more borne out by statistics, it is that recoveries are most numerous in cases which have been properly treated at an early date.

The same feelings which cause friends to withhold their insane relatives from an asylum prompt them to take them away at the earliest possible date, as soon as there is an apparent improvement, which

may not be real recovery but only a step towards it. They come and visit a patient under treatment and spend a short time with him, during which he exercises great control, and by dint of much exertion is able to talk rationally. Very often this effort is productive of much evil, and after such a visit he is markedly worse. Yet if this is represented and the visits stopped, such prohibition is looked on with the gravest suspicion, and the friends are quite certain that the patient is well and is being unjustly detained. Many in the stage of half-recovery will exclaim violently against the place they are confined in and the wickedness of their detention. This is not a sign that they are well, and I have often had to tell the friends that if they will wait patiently, they will find that as convalescence advances the complaints will grow less and less, and the sense of well-being and restored health will work an entire change so that a man will become friendly and grateful to those about him, not pressing unduly for his liberty and willing to take advice concerning his future. This change of feeling will be familiar to all who have charge of the insane, and it is a change which often greatly surprises the friends of the patient. It is very satisfactory to find it, and to know that there is a consciousness of former mental disorder, and an amendment and return to right reason, and often we hear a man wonder how he could ever have held the ideas and delusions which now he utterly repudiates.

But this is not the case with all. Some will never admit that their ideas were delusions, but they will try to justify or explain them away, will deny having held them, and argue that there was no necessity for placing them under restraint. They will assert that their disorder, depression, or excitement is the result of their being shut up, ignoring everything that happened previously, and attributing evil motives or ignorance to all concerned. The difficulty of deciding as to whether a patient is recovered or not is sometimes great, though generally it is much easier for the physician who sees him continually than for the friends who visit for an hour or so. Each, however, can help the other. The physician may never have seen him before the illness and does not know what is his normal condition. Often I have been assured by near relatives that a patient has not recovered because his conduct, demeanor, or habits, though not absolutely indicative of insanity, are not the characteristics of his sane and healthy state. But all friends are not so candid; those who have had sad experience of his mad behavior dread his release and wish him to remain till recovery is complete, while others are over-eager to set him at liberty, being afraid of his displeasure and threats, forgetting that a half-cured man is of all the most likely to be dangerous to them.

We shall have to base our diagnosis of recovery upon what we hear

from the patient himself concerning his illness, its oncoming, its cause and symptoms, and may detect delusions still remaining concerning them and especially the cause. And we must compare that which he says to us with what he confides to others, whether friends, attendants, or other patients. The insane soon find out what it is that keeps them in an asylum. Much cross-examination from commissioners, doctors, and others teaches them that it is this or that delusion that stamps them as uncured and prolongs their detention. They will then declare that it is gone, and that they have quite given up the false idea. The truth of this is often hard to determine and it has to be gauged by their conduct and demeanor, and ascertained by what is said to others or written. A patient's letters will frequently show that a delusion, though denied, is still present, and when there is a doubt they should be carefully examined. Moreover a man may declare that he has never had delusions, he may single out the small grain of truth which underlies so many of the delusions of the insane, and may assert that this justifies all that he has said. It may be thought that a patient cannot be recovered who justifies previous delusions, but much allowance must be made for individual temperament and character. Some men and women cannot bear to think—and much less to confess—that they have been insane or have entertained insane fancies, or done insane acts, and satisfy their consciences and salve their wounded pride by explaining away as much as they can. This we must often overlook and not too rigidly compel confession, or too closely cross-examine as to the details of the past. The best way to dispel delusions is to avoid discussing them. We must let bygones be bygones, for delusions spring to such an extent out of the feeling of the moment that a patient a month or two afterwards in an altered physical condition cannot go back to the ideas he held in his former state and may deny or justify them, because he is unable now to enter into a contemplation of another state of things. We have to consider the whole manner in which he speaks of himself and his treatment. If he is ashamed and would rather let the subject alone and talk of the future and returning to home and work, and if his talk of the present and future is healthy and hopeful, we must not be too particular in judging of the manner in which he speaks of the past. But if he is perpetually harping on the past, reviewing and discussing every detail, as he imagines it happened, and always complaining and threatening retaliation, lawsuits and the like, and if he craves for liberty in order to commence such proceedings rather than return to his usual avocations, we must look with suspicion on his condition, and advise further detention or surveillance in some form or other. In coming to a decision upon such patients there is

no rule to be observed absolutely. The recognition of insanity or recovery thereform depends chiefly on experience and the intuitive appreciation which experience gives.

Very difficult is it to decide as to the recovery of a patient whose insanity has been displayed not so much by delusion as by acts and conduct, and partakes rather of the nature of so-called moral insanity. Kept under restraint he has no opportunity of indulging in acts of extravagance or vice, or of getting drink which brings him to them. Promises he will make with earnestness and sincerity, but we have to consider whether he is able to keep them if free. We must take into consideration the way in which he speaks of his past conduct and perhaps justifies it. A patient may have no delusions in the ordinary sense of the word, but if he justifies and defends outrageous conduct and cannot see that his acts are those of a lunatic, it is impossible to say that his intellect is unharmed or his mind sound. Nothing but a trial can set this question at rest.

The English legislature comes to our assistance in every case of doubtful recovery and enables us to send a patient forth into the world "upon trial" provided he goes "under proper control." What the control is to be is not specified. It may be the companionship of husband or wife, of sons or daughters, or a medical or other attendant. He need not be restricted to one locality, but must not go beyond England or Wales. This "leave of absence" the commissioners in lunacy will grant for three months, and will renew it, if necessary, for another three, and if there is a breakdown, the patient can at once be brought back to the asylum without further formalities.

TREATMENT.

The first physician to be consulted when symptoms of insanity are noticed in a patient will be the family medical adviser. He will have to pronounce an opinion before any specialist, and it often happens that the friends strenuously resist the calling in of the latter. The difficulty throughout will be the management not of the patient but the friends. They will refuse to believe that the mind is affected, will try to explain away all the alteration of conduct or extraordinary acts, and tell us that the symptoms have only lasted a few days or weeks when they have been gradually increasing for months or years. From many the information received is wholly misleading and has to be supplemented by what we hear from others, more distant relatives, friends, or attendants. From them we may gather the true but widely different history.

The opinion of the physician will be much influenced by the dura-

tion of the illness, if he can arrive at the truth, and the family attendant is favorably circumstanced in this respect. That which comes on quickly may go off quickly, but that which has slowly and insidiously advanced for months past is not likely to vanish suddenly, but implies a course of treatment which must be continued for some time. And the reason why it has been going on so long is the unwillingness of the friends to see anything amiss; they shut their eyes to the plainest facts and refuse to take advice till something occurs which can no longer be concealed or ignored. Insanity in a large number of cases is a curable disorder, but that upon which all authorities are absolutely agreed is that for cure, early treatment is necessary. This period, the stage when treatment is valuable and recovery almost certain, is constantly lost by the obstinacy of friends, who think they know how to treat the disorder better than any doctor. When at last the patient is brought to us, he is a confirmed and hopeless lunatic, requiring care not cure, to be kept in safety for the term of his natural life, and when he is placed in an asylum they are greatly astonished if we say that it will not cure him now, because they have been told for a long time that an asylum would effect a cure and was the proper place for such a sufferer. When a physician is consulted he will be asked not only to recommend treatment but to give a prognosis. This again will be affected by the duration. If we hear that a man has had delusions and hallucinations for more than a year, our prognosis is unfavorable; but it will also greatly depend on whether the friends are willing or unwilling to take the proper steps to bring about recovery. The physician called to a case of ordinary illness receives a coherent and true account of the symptoms, past and present, from the sick man, his friends, or nurse. He is generally enabled by what he hears or sees to arrive at a tolerably accurate diagnosis and prognosis, and is confident that all will be done for the sufferer that can be done, that his directions will be strictly adhered to, and that the patient himself will second his efforts and try to get well. When the friends of an insane patient are told that the disorder is curable, but that to effect a cure it is necessary to place him under restraint or in an asylum, they straightway vow that they will not hear of such a thing, that an asylum means legal formalities and publicity, that an asylum will stamp him a lunatic, will interfere with his future career, and prevent his daughters from getting married.

If we are consulted sufficiently early, it may be possible to ward off an attack of impending insanity, and at this time there will probably be less difficulty in getting our advice followed, inasmuch as it will not be so distasteful. In the large majority of cases removal

from home in some form or other will be necessary, such removal depending upon the aspect and probable course of the disorder, which will have to be carefully studied before our advice is given. If a patient is depressed, the depression having existed for some time with but little variation, and there being an absence of all acute symptoms, if food is eaten and walking exercise can be taken in public places, we may recommend change in the shape of travel with suitable companions. This however requires much consideration. What the patient wants is *distraction*, and it will be well if he leaves behind as much as possible that which is a care and anxiety to him. An anxious wife to whom he can always pour out his sorrows, imaginary or real, is better absent; friends are better than near relatives, strangers are better than friends. The locality must be carefully chosen and extremes of heat or cold avoided. There can be no greater change for any one living in the United States than a trip to Europe. The sea voyage is not long enough to be monotonous, every kind of climate can be selected according to the time of year, and every taste can be gratified in one country or other. If such a journey is impracticable, it will be well to send him as far from home as possible, to interdict frequent letters, and to create new thoughts and interests which shall supplant and oust the morbid ideas and fancies which fill the mind.

All patients, however, cannot be treated in this way. Many show signs of depression at first, but this rapidly changes into excited melancholia or mania, requiring an amount of restraint which makes travel impossible. Others are excited from the first, and whether the excitement takes the form of grand or exalted ideas with lavish squandering of money or violence and angry feelings and accusations, restraint is equally necessary, and this must be set before the friends without delay in order that accidents may be prevented and treatment adopted which may conduce to recovery. Where is such restraint to be carried out? Friends, nine out of ten, will try to avoid an asylum, and will beg to be allowed to try a private house with attendants. In the case of women some such method may be tried for a time, if there are sufficient funds for an adequate staff, companion and nurses, and a suitable house with private grounds. Patients also suffering from very acute delirious mania, as has been said already (page 127) may be treated as sick people in a house of this description. But when a man is excited and dangerous the first place for him is a well-conducted asylum, and it is our duty to put this strongly to the friends. We shall be met with every conceivable objection. Wives are afraid to take any step of the kind without the consent of the husband's relatives, and of these there are sure to be some who not being personally

incommoded will strongly oppose. Husbands want the sanction of the relations of the wife; each is certain that the other will never forgive this method of treatment, and then they will bring forward an argument which is continuously used but is entirely chimerical, that the individual will go "quite mad" when he finds himself in an asylum amidst a number of other patients. That this theory is utterly devoid of truth is well known to all who have charge of the insane, for so far from patients being worse when first placed in an asylum, it is a fact of everyday experience that they are generally better, so much better that for a time we are often puzzled to find out the facts stated concerning them, so greatly are they influenced by the orderly discipline and regularity of the place, by the sight of others behaving in a quiet and decorous manner, and by the feeling that there is an authority over them to which they must succumb.

The friends may not be persuaded at first; they think they know more about it than we do, and will take care of the sufferer themselves. This has often happened, but in a few weeks they have had enough of the experiment; the patient has got worse instead of better, and their nerves are completely unstrung by anxiety and watching, so they are much more disposed to listen to argument. They have found out that he is quite as indignant and angry at being restrained by them in a private house, especially if it is his own, as he would be in an asylum, and probably makes more determined efforts to get away because facilities for escape are more numerous, and he recognizes no authority for his detention. If instead of being maniacal, he is acutely melancholic and suicidal, all places will be alike, but in an asylum he will not have perpetually before him the faces of those who are dearest to remind him of his former state and changed condition. Unless a patient can be placed in a position well suited for his recovery outside an asylum, he is better in one, and herein the poor have a great advantage over the wealthy, for when they become insane and troublesome there is no question or doubt as to what is to be done with them. They are placed at once in an asylum and receive early treatment of the most appropriate kind. If the friends can be brought to see that an asylum is necessary, the next difficulty is the choosing one. They will want the smallest that can be found, where the patient can bury himself in private apartments of his own and see nothing of the other inmates. He is, in other words, to sit with an attendant to watch him, brooding over his fancies from morning to night and night to morning. This is to perpetuate all the evils of home treatment.

A leading feature of insanity is the intense egoism, the extreme

concentration of all thought and feeling upon the one subject, self and all that concerns self. Whether the individual's feelings are those of self-satisfaction and exaltation or of gloom and despondency; whether he thinks himself the greatest man in the world or the most miserable, he is constantly absorbed in the contemplation of self and thinks that the whole world is directing its attention to him. If such a being is at home he generally contrives to make himself the centre and focus of every one's regard; and if he is away with a friend or a physician, or is placed in a family, he may be able to do the same, for in the majority of cases the arrangements of the household must more or less depend on the presence of such an inmate. This egoism will not be removed by his occupying private rooms in an asylum with special people to look after him. He becomes the focus and centre of these, and if he is to receive the visits of sympathizing relatives or their letters, and to pour out his complaints to them in return, the good of an asylum will be neutralized. Place him among a number of other patients and he becomes a fractional part of the whole. He is given to understand that the establishment will go on just the same whether he is there or not, but that being there and legally placed there, he must conform to the rules, his going away depending largely on his own behavior and observance of the precepts and advice which he receives from those in authority over him. He is encouraged to follow this advice by their approval, and is indulged with an amount of liberty according as he shows that he is fitted to enjoy it, liberty to go beyond the premises or to places of amusement, to have money at his command and choose his own recreation and occupation. This liberty he forfeits if he abuses it, and strict surveillance and watching are exercised until he shows that he can control himself.

So far from its being a disadvantage to a patient to be with others, it is very often an immense benefit, and for this reason an asylum should not be too small. There is a healthy public opinion among the inmates of an asylum as well as among those outside. A good-sized asylum offers materials for classification. If a patient does not behave properly in the room dedicated to quiet and orderly individuals, he will very soon hear of it, probably from some of the others, and will speedily find himself removed to one lower in the scale, perhaps two or three degrees lower, and from this he will again ascend on good behavior. Not only will his conduct be influenced by the example of those around him, his delusions and fancies will also be affected. Patients who cannot see that their own ideas are delusions can recognize those of others without any difficulty, and when a man is told by another patient to hold his tongue and not

talk such utter nonsense, it comes to him with far greater effect than if solemnly argued by some one in authority over him.

An asylum of a certain size offers many advantages in the way of occupation and amusement. The question of occupation is very important, for we supplant morbid thoughts by distracting the mind from them to others, which is of far more use than trying to oust them by argument. Though in the convalescing stage argument may sometimes be useful, it is very often harmful and likely to perpetuate a delusion by directing the mind to it. Occupation, however, for gentlefolks is a difficult problem, and here will be shown the tact and resourcefulness of the presiding physician, who must invent for each something to be done, not mere games such as tennis, cards, or billiards, but something which shall occupy the thoughts and be continuous, going on day after day, with a result to be acquired by mental effort.

I recollect at the Medical Congress of 1887, the president of the Psychological Section, Dr. J. B. Andrews of Buffalo, remarked that years ago when he used to note the large percentage of patients employed in some of the English asylums, he questioned in his own mind whether those statistics were really honest and correct. But after making use of occupation for years and having opportunity to control the matter, he fully believed that those statistics were correct. He employed at the present time in the Buffalo asylum from seventy-five to seventy-seven and seventy-eight per cent. of all patients.

Occupation for the lower classes is comparatively easy to find. They are accustomed in their sane life to work with their hands, and in asylum life there is much on which they can be employed, in farm or building work out of doors, in carpentering and other handicrafts indoors, and women can be usefully exercised in sewing and mending or in the laundry. The problem which is difficult is the employment of patients of the upper class. In point of outdoor exercise men have the advantage. They can take long walks, ride, or play outdoor games. For many outdoor exercise and hard exercise is a necessity; in subacute, restless, sleepless mania protracted muscular work will bring healthy fatigue and sleep, and act as a sedative more efficacious than drugs. Hard exercise will distract another whose thoughts are fixed unceasingly on melancholic subjects. I have known a man of his own accord dig all day in the garden—dig a pit and fill it up again if there was nothing else for his spade to do—and greatly profit thereby. This is not mere moral treatment, it is physical as well. Beyond mere occupation it has a physical effect. Says Dr. Clouston (*op. cit.*, p. 175), speaking of this restless mania: "No patient must on any account, or in any weather, except he is ex-

cessively run down, be kept in bed or in the house. I often keep patients out all day in the summer time. When they are getting better, they all say that they feel better out than in. There is no soporific nor calmative and no digestive like the fresh air." For ladies it is not so easy to provide outdoor exercise other than walking, but this is often most beneficial, especially to those who have never walked before, and they are many. I once had a patient, not in an asylum, in a state of profound melancholia and I got her to walk. She walked till at last she went twice every day from her house in Belgravia to Hampstead, a distance not less than sixteen miles, necessitating two people to accompany her. One curious feature in the case was that when I visited her she never would open her eyes, though she conversed freely. A long time after, when she had quite recovered, she sent for me, and among a number of others I did not recognize her. We saw each other with the eyes open for the first time.

Indoors ladies are better off than men; they have needlework of all kinds and music, but they cannot be always playing music any more than men can be always playing billiards, and we require for them something which shall employ their minds. Some may come to us whose brains have been overtaxed, and it may be necessary for them to rest and do nothing; but the majority have not undergone overwork, but worry, the worry of business or domestic trouble, and for them some mental occupation will distract the mind and supplant the morbid thoughts. They require something which will not end in a day, but will engross their attention day after day and week after week. For this I have found the study of languages very suitable. It is intellectual without being emotional, and is never-ending. I have known ladies study Greek and Hebrew, to say nothing of French or German, Italian or Spanish. Another occupation which I greatly advocate is drawing. If a patient has any taste or inclination for anything of this nature, flower painting, sketching from nature, or even copying pictures, it should be encouraged as much as possible. It occupies a great deal of time, is not emotional, and there will be a feeling of improvement and advance which will be very beneficial.

Not every patient, however, requires employment or amusement. To many an asylum is beneficial because it is a haven of rest, and this rest, as it is urgently needed, must be rigidly maintained. There is probably nothing that could be invented which does patients so much harm in their convalescing stage as the visits of friends, and nothing so hard to prevent. Naturally relatives wish to see how they are looking, how they are getting on, to hear what they have to say, and

any complaints they have to make. I have known a visit of this kind to undo all the progress that has been made, undo the work of many weeks, but it is hard to persuade friends who are often suspicious and think the asylum physician has some motive in keeping them away. The sight of a relative may recall all the troubles that were the origin of the illness and all the delusions that grew out of them. It will create a restlessness and discontent with the place, and a desire to be released which cannot be conceded, and when the visit is over there will be bitter disappointment, a sleepless night, and general deterioration. Later a visit may do much good, but one of the great advantages of an asylum is the removal from friends and the letters of friends. Rest and quiet are the remedies for many—no letters, no telegrams, no daily newspaper, if they are likely to worry or excite. When the patient is fit for occupation or employment, it must be supplied according to the standard and measure of his mental capacity, and care must be taken to regulate the amount.

A good deal of all the preceding may be summed up under the head of moral treatment, which is absolutely necessary for the treatment of the insane. Yet it must not be supposed that the whole of the asylum life is moral treatment only, even if a patient comes in and goes away recovered without having taken a single dose of medicine, as not unfrequently happens. The rest, the opportunity of getting abundant and undisturbed sleep, the good and appropriate food and drink carefully regulated according to the bodily condition, these are all matters of physical treatment, and upon them depends the recovery of many a sufferer.

Nevertheless we are much indebted to medicines for aid in our efforts to restore the mental balance, and these may be broadly divided into two classes, sedatives and tonics, though of course others may be required for any intercurrent ailments. Of sedatives and their use in some of the acute forms I have spoken incidentally. There is a long list of them. I can recollect the days when there was not one worth calling a sedative except opium, and that did harm in as many cases as it did good. Since then we have seen the rise of the bromides, chloral hydrate, chloralamide, paraldehyde, sulphonal, trional, tetronal, and others, some of which deserve mention.

Bromides.—As the bromides, especially bromide of potassium, were the earliest of all the sedatives now in use, they may be noticed first. None are more used. So universal is the administration of potassium bromide in the treatment of neurotic patients, whatever the character of the disorder, that scarcely any one escapes. That it is a most potent and useful drug none will deny. "It is a general depressant to the tissues, the frequency and force of the heart's action are low-

ered, the muscles are relaxed, sensation is impaired, and sexual vigor also; the receptivity of the brain is diminished, the motor area is less easily roused into action, the finer workings of the cortical cells are interfered with; there is mental apathy even to hebetude, and the memory is impaired."[10] From this summary of its effects it will readily be understood that in certain cases and at a certain stage it is most valuable, but that given to people already feeble or depressed it is very injurious and increases rather than removes the symptoms.

One reason of the universal administration of this drug is its safety. It may be ordered in ordinary doses without producing any dangerous effects, such as prolonged coma or narcotic poisoning or collapse. The worst that happens is some so-called bromism or bromide-acne, and this does not appear at once. Bromide is most useful, as Dr. Clouston has remarked, in the preliminary stages of insanity before the symptoms have developed into decided psychical aberration, when they are chiefly sleeplessness, irritable restlessness, and commencing want of control. Here a few doses of bromide at night may work wonders. It is a medicine to be given for a short rather than a long time. I once saw an old lady of seventy-five, who had lost her memory from age, and who had been sent into the country by her medical adviser and ordered to take sixty grains of bromide daily; this she had done for weeks till her speech was unintelligible and she was hemiplegic. All this passed away when the bromide was discontinued and she lived fifteen years without any return, the memory only remaining defective. It is most useful in the early stages of mania and in the clamorous and self-asserting excitement found in young people which often appears as the reaction stage after a long period of depression. I lately saw a young girl in this condition; she wanted to do just what she liked, however foolish, set her mother at defiance, and was inclined to run after men. It was a question whether she would not have to be placed under restraint, but a week's course of bromide produced an excellent effect and the removal was averted. As it is beneficial in the young and "sthenic," in excited mania and insanity from drink, so is it harmful in melancholia where it will hasten emaciation and increase the depression. Until it is discontinued it is often difficult to decide how much is due to the disorder and how much to the drug. But it is to be remembered that bromide is a sedative, not an hypnotic. Where there is great sleeplessness and it is absolutely necessary to procure sleep, bromide by itself is not sufficient. It may be given by day to procure quiet, but to bring sleep it should be combined with chloral hydrate. Twenty or twenty-five grains of the latter with thirty of

bromide often give an excellent result. There are other bromides besides the potassium salt, the two most commonly used being the ammonium and the sodium salts. These are said to be less depressing; they are certainly less potent. There are various others, among them the bromide of strontium, which I have given with advantage in epilepsy. It is said that the troublesome bromide-acne may be prevented by the simultaneous administration of five minims of the liquor arsenicalis.

Chloral.—This drug was the next sedative introduced after bromide, and it has been of immense service, though ill effects may have been caused by its abuse, especially in those who have dosed themselves with inordinate quantities. It has been superseded to a considerable extent by newer drugs, as sulphonal and paraldehyde, but the prejudice which has existed against it in the minds of some is, in my opinion, quite unfounded. The ill effects have, I believe, mainly been caused by the ordering of unnecessarily large doses. I have known people to take twenty grains when ten would suffice, or thirty when twenty would have been amply sufficient. The result is headache the next day and drowsiness. It is to be remembered that it has a depressing effect on the respiration and heart action, and therefore too large doses may be dangerous. It has one great advantage over sulphonal or paraldehyde in its greater rapidity of action, which enables us to give it in the middle of the night. Many patients sleep when they first go to bed, waking in two or three hours; a dose of chloral will send them to sleep again after they have got what natural sleep they could. Chloral may be combined with bromide in some cases and with opium in others. Both are excellent combinations, the first being suitable for the excited and the second for the melancholic. It is efficacious in epilepsy, especially in the *status epilepticus*, when it must be administered by enema. Here, however, an inhalation of chloroform produces a quicker result.

Chloralamide.—This drug has its warm supporters and is said to be less dangerous than chloral, as it does not depress the respiration or circulation or lower the temperature; moreover it does not interfere with digestion. Collapse symptoms, however, have been observed and attributed to it, probably after a large dose. Its action is less rapid than that of chloral, though quicker than that of sulphonal, and it is not accompanied or followed by depression, giddiness, or motor incoördination. It is decomposed in hot water and by alkalies, the best vehicle for administration being a weak alcoholic solution. I have had considerable experience of this drug latterly and have been quite satisfied with its action.

Sulphonal.—Of the modern drugs none has been used so exten-

sively both by the profession and the public as sulphonal. I have used it very often and am disposed to think it a valuable medicine, with some, but not many, drawbacks. One of the latter is its insolubility in cold water. It is tasteless, and so can readily be mixed with any white food, as porridge or milk puddings; but it is not always easy to get food taken at odd times. It can be given in hot milk or water, or suspended by means of mucilage. Tabloids are another mode of administration, but as they generally contain only five grains, the patient has to take a number before he arrives at a full dose, and there is always the risk of his spitting them, or some of them, out instead of swallowing them. Its action is slow, slower than chloral, and therefore it should be given early, an hour and a half or two hours before bedtime. Another drawback is that if the drug is pressed or large doses are given, it produces giddiness and staggering gait, and weakness generally of the lower extremities very like the condition of a drunken man. To complete the similarity, there may also be difficulty of speech. All this proceeds from the administration of too large doses. I have given doses of twenty grains nightly to a general paralytic for years without any such effect. When doses of forty or fifty grains are given, such results may be expected. It is said that if this drug is given in combination with a tonic these symptoms do not appear; but large doses are not required continuously, and the effect is produced not by a single large dose, but by an accumulation from large doses repeated frequently. One great advantage which it possesses is that the sedative effect is continued to some extent throughout the day and even through the next night, so that is is often possible to give it with good effect on alternate nights only. Patients under its influence sleep soundly in the majority of cases and do not wake in a state of great excitement as they frequently do after chloral. Many cases have now been recorded of a peculiar appearance in the urine of those who have taken sulphonal for some time. It acquires a deep Burgundy-red color due to the presence of hæmatoporphyrin. It is not due to blood and contains no albumin, but the spectroscope renders its identification easy. In the case of a young woman in whom it appeared, other symptoms of failure of health had been observed. These together with the color in the urine entirely vanished when the drug was discontinued. When this medicine is taken for any length of time the urine should be carefully watched.

Paraldehyde.—This is a drug which has been received with great and deserved favor and largely prescribed. Chemically, it is closely allied to alcohol, and it shows its relation by its action, affecting first the brain, then the cord, then the medulla oblongata. If it is harm-

ful, it is because it has a tendency to paralyze the respiratory centre, and we are told that in dyspnœal states with dilated heart it must be used with much care. With this exception it is a very safe medicine, and I have given it for long periods without any drawback, even to elderly people. The sleep procured by it appears to be peculiarly quiet and refreshing and the waking unattended by excitement. The chief objection on the part of patients is the smell and taste, but I have not had it rejected by more than a few, and some, especially women, after a time rather like it. It imparts a disagreeable odor to the breath, which is easily perceived by those in the same room. It is said that this can be obviated by the dose being swallowed through a tube. I have found that the best way of giving it is in almond emulsion or in orange wine, and the latter is easier to keep, and as a rule is preferred. In the treatment of insanity the dose should be at least a drachm, and this may be increased without fear to two drachms. Dr. Clouston advances the dose to three or four drachms, and has given four drachms for a fortnight to a general paralytic. It has been objected that the prolonged use of large doses produces a state resembling chronic alcoholism, but I have had no experiences of this kind.

There are some other substances which are used to some extent, but not so frequently as the foregoing, one of these is *tetronal*, a body closely allied to sulphonal, but with two molecules of ethyl instead of two of methyl. Its effect is much the same as that of sulphonal.

Trional is another of the series, and has been more used. It is more soluble than sulphonal, and is said to be very useful in mania with excitement, but harmful in melancholia and hypochondriasis. A dose of fifteen grains is sufficient, at any rate to begin with.

Hyoscine.—We now come to two very powerful drugs which are almost always given hypodermically, and as we are directed to begin with gr. $\frac{1}{100}$, it is certain that caution must be observed in the administration. Hyoscyamus is a very old remedy in insanity, and the tincture given in sufficient quantity or in combination is decidedly useful; but the alkaloid hyoscine, for hyoscyamine is now rarely used, is a medicine of great power and much care is required. Given by the mouth, it seems to have little effect. Given by hypodermic injection it acts by producing a loss of power in the limbs and a condition of stupor rather than sleep. Many patients have a great horror of the feeling and dread the repetition. In a discussion at a meeting of the Medico-Psychological Association in 1891 great difference of opinion as to the benefit was manifested. Dr. Savage narrated the case of a woman who died after a dose of gr. $\frac{1}{200}$. It should be given

only to those who are in good bodily health and suffering from recent mania, not to those worn out by long-continued struggling and sleeplessness. It is more suitable for patients in an institution, where there is always a medical officer to watch the effect, than in private practice.

Duboisine.—The same may be said of this drug, which is given in the same way in doses of gr. $\frac{1}{150}$ to gr. $\frac{1}{75}$. It is recommended to be given in epilepsy, in periodical insanity, and acute mania. It lessens excitement and produces sleep, but large doses cause a drunken condition, giddiness, vomiting, tonic and clonic convulsions, hallucinations, and delirium.

Opium.—There is great difference of opinion as regards the use of this medicine in insanity, a difference arising probably from the variety of the preparations used. I have seen too many cases of melancholia cured by means of opium to have any doubt of its efficacy in this disorder; but it is, in my opinion, just as harmful in the excitement of mania or general paralysis. In melancholia it not only procures sleep but acts also as a nerve tonic, and allays the terrible feeling of depression which the melancholic experience, especially on first waking in the early morning. But it is to be remembered that opium in any preparation is not suited to every person, sane or insane. If we were to take the first hundred persons we meet and give each a full dose of opium at bedtime, the effect in a large number of cases would be not the production, but the prevention of sleep. We have to ascertain by trial whether its administration is beneficial or not. I have found solutions of opium preferable to the alkaloid morphine. The latter, whether given by the mouth or hypodermically, is apt to cause sickness and constipation, serious evils when we have to deal with refusal of food. Solutions of opium have not this effect to anything like the same extent. Hypodermic injections should be avoided if possible, for they often give rise to delusions which have their origin in this mode of administration. Whether we give opium or morphine, the quantity is small and can easily be mixed with food or drink.

Forcible Feeding.—In many cases it is of the utmost importance to administer food and a plentiful supply thereof, for it often happens that a patient has been allowed to go without any worth speaking of for days, and great exhaustion is the result. For one reason or other a great number refuse food; some think it poisoned, many think it is wicked to take it, or that others want it more, or that their inside is blocked up so that nothing will pass through them. And the degree of resistance they will offer will vary from a mere protest, which does not prevent their being fed, the food being carried to the mouth by a spoon, up to a desperate resistance by which the patient, per-

haps a powerful man, will struggle with all his might to avoid taking the nourishment we wish to give him. Such a one is not in a state of extreme exhaustion, but when this is the case, food must be administered at once, and we must decide what method of feeding is to be adopted. There is the old plan of forcing the mouth open by a spoon or stick and pouring liquid food down, the nostrils being closed at the same time. The objection to this is the length of time it takes. If we are dealing with a patient who is weak and prostrate and the struggle in feeding lasts half an hour, the patient loses as much by the fatigue as he gains by the food. But when there is no exhaustion and the food is refused to give trouble and necessitate frequent visits of a medical man, it is as well sometimes to cause the feeding to be done in this way by the attendants, and the refusal often comes to an end through dislike to the mode of administration.

There remain two methods of forcible feeding, one by the nose and the other by the mouth. Each has its advocates, and there are certain variations in the way each is performed. In feeding by the nose some use a funnel placed in one nostril, others a short india-rubber tube affixed to a feeding-bottle, others a long tube which will reach the stomach through the nostril. The objection to either of the two last is that a resisting patient is very apt to get the tube between his teeth; we have very little command over the end of it when it enters the fauces, and being small it may easily be sucked into the larynx. For this method it is better to place the patient lying down on a bed or sofa.

There are not a few, however, who cannot be fed by the nose, being too violent and resisting too strongly. They must be fed by a stomach tube passed through the mouth. Some feed their patients lying down. I myself think this a most awkward plan, as the operator has to lean over the man in a most uncomfortable way in the midst of the attendants who are holding him kicking and struggling. He must be rendered motionless, which cannot be done by a number of attendants grasping him. He should be placed in a strong arm-chair, and his body, arms and legs swathed in sheets, which can be drawn round the arms and legs of the chair till he is rendered incapable of motion. By this means all sudden movements and consequent accidents are prevented; he cannot struggle, therefore there is no exhaustion and no bruising. A man held two or three times a day by attendants will very soon be a mass of bruises, and we know what the friends are apt to say about such an appearance. The teeth are to be gradually opened by a screw-wedge or gag which should be applied in the median line, not at the side, as there is greater power of resistance in the latter. When the teeth are sufficiently separated,

a hard-wood gag is inserted and held by an attendant standing behind the chair, and through it the tube is passed. This should be of a size that will not enter the glottis, and whether it be made of gum or of red rubber it must be flexible to the end. When passed through the hole in the gag we incline it to our right, having previously well oiled it. No force is required; if it is held by the tongue we wait till the patient is obliged to take breath, and the hold is released, and the tube slides within the action of the muscles and being swallowed, so reaches the stomach. The instrument we employ may be the stomach-pump, a rubber bottle, or a funnel into which the food is poured. The advantage of the first is that with a large tube and large pump the food need not be mere liquid, such as will run from a funnel, but may consist of finely pounded meat and soup mixed with potato, or a thick custard of milk and eggs. Also we can better regulate the speed with which it is introduced into the stomach than when it is poured in large quantity through a funnel. I have rarely known a patient sick after being fed by the first method, and in this respect again I believe the sitting posture to be greatly superior to the recumbent.

The Weighing Chair.—Mention of this may fitly follow what has been said concerning forced feeding. Of the vast importance of an adequate supply of food in the treatment of insanity there can be no doubt, and our test of this supply and of its efficient action is to weigh the patient. Almost all, if the mental disorder has been other than of very brief duration, will have lost weight, some melancholics to a large extent, and the weighing machine will tell us whether our treatment is producing the effect we desire, and whether the food needs to be increased, for no melancholic person who is much emaciated will recover his mental health and yet remain in the same emaciated state. It will also tell us if a patient who is taking, as we suppose, an adequate amount of food every day and sleeping fairly well, still continues to lose weight, the cause whereof we must investigate. We may find that the food has not been taken, but when the attendant was not looking, it has been secreted or thrown away; many are cunning enough to do this. There may be some disease of another organ, but the patient will say nothing about it, for many will not complain even if they are suffering pain. Also the thinning may be due to masturbation, which is often the cause, there being nothing else to account for it. It seems to occur periodically in some demented patients, during which time they lose flesh rapidly. Great vigilance is necessary both by day and night to prevent this practice.

Ophthalmoscope.—This instrument has now been in use for a considerable number of years and many observations have been recorded.

I do not find, however, that any very definite results have been obtained. It is found, as might be expected, that the greatest changes occur in the later stages of general paralysis and in syphilitic patients. But Dr. Savage tells us that "in the early stages of general paralysis, whatever the variety, there is no constant change in the discs. There is no hyperæmia, no grey degeneration, nor any alteration either in vessels or nervous tissues. Later, and more generally, changes begin to show themselves towards the end of the second stage, and although it is uncommon to find any really distinct optic neuritis, changes associated with dimness of outline of the disc and with fulness of vessels become manifest" (*op. cit.*, p. 328). The changes in the other forms of insanity are just what we should expect to find. In mania, abnormally red or congested discs; in melancholia, an anæmic condition, not amounting however to anæmic neuritis. In epileptic insanity or in syphilitic, the appearances noted in the eye depend upon intracranial lesions, and in patients affected by chronic alcoholism or other poisons such as tobacco the same atrophic changes may be noted whether there is insanity or not.

Electricity.—That nervous disorder can be cured by galvanism or electricity is a very old theory which dates back to the commencement of the century. Since then it has been in and out of fashion, and much discredit has been thrown upon it by indiscriminate quackery. Much must depend on whether the patient is treated by the constant or the induced currents, the latter acting as a stimulant and being of use in cases of primary dementia or stuporous melancholia, the former being rather of the nature of a sedative and beneficial when there is excitability. I have found much difficulty in the application on account of the dislike which patients have to it. They are apt to look upon it as a punishment if we insist on the operation, and found thereon all manner of delusions of persecution and torture, electricity being a common form of such delusion.

Thyroid Feeding.—The treatment by means of thyroid extract which has been so successful in cases of myxœdema has lately been extended to insanity, and some remarkable results have been recorded, chiefly by Dr. Lewis Bruce.[71] Knowing the improvement often witnessed in patients after febrile attacks, carbuncles, and the exanthemata, he aimed at inducing fever with its resulting reaction. The patients were weighed, put to bed, and pulse, temperature, and urine carefully noted for three or four days. Thyroid tabloids were then administered thrice daily, either with the ordinary meal or immediately after, the quantity being from thirty to sixty grains per day. The drug was given till a feverish condition was induced for two or three days; when the pulse became rapid, soft, and compressible, the

limit of safety was considered to be attained, the treatment was stopped, the patient remained in bed for several days and was then again weighed and afterwards treated by a tonic and extra diet. Most gratifying results followed the treatment in various cases in which patients threatened to pass into confirmed dementia or had remained stuporous for long periods. Dr. Bruce propounds the following questions as to the way in which the beneficial effect is produced: 1. Is the action due to the febrile process induced by the thyroid, and the subsequent reaction to the fever? 2. Is the thyroid extract a direct brain stimulant? 3. Does the ingested thyroid supply some material to the body which the gland is supplying in deficient quantity? He is of opinion that the febrile condition has all the appearance of being induced by a toxin introduced into the blood through the medium of the mucous membrane of the stomach. With regard to the second question he considers the thyroid to be a direct brain stimulant. Various patients from being quiet and demented became lively, elated, and maniacal, some relapsing into their former condition when the treatment ceased. This is what is frequently seen when some intercurrent febrile attack occurs in chronic demented patients. With regard to question three, he thinks there is a strong probability that at some periods of life the administration of thyroid supplies some substance necessary to the bodily economy.

Hypnotism.—Although hypnotism has been investigated by many during a long period of time and invested with great interest as a psychological study, its therapeutical value has been but little tested. In the *Journal of Mental Science* (January, 1893), Dr. George M. Robertson gives an account of various patients hypnotized by him at Morningside Asylum. One, a woman suffering from melancholia at the time of the climacteric, improved greatly under the treatment, and her recovery was in Dr. Robertson's opinion materially aided by it. It was useful in the case of epileptics in their intervals of comparative sanity, dispelling the headache and confusion they felt at such times. Excited patients were often sent to sleep by this process and awoke quieter even though no permanent good resulted; in the excitement of puerperal and epileptic mania it was also useful. Dr. Robertson summarizes its use among the insane as follows: (1) In insomnia; (2) as a sedative in excitement; (3) to dispel fleeting delusional states; (4) To overcome the morbid resistance of patients; (5) as a substitute for restraint.

Hypnotism has also been tried at Bethlem Hospital, but without much success. Dr. Hyslop tells us[72] that "Drs. Percy Smith and A. T. Myers found that of twenty-one cases in which it was tried, only two were certainly hypnotized. In one case the suggestions made

were not acted upon, and in the other, although suggestions seemed at first to be in a very small degree successful, the effect, instead of increasing, diminished rather rapidly. When any improvement was noticeable in the other cases, the results gained were attributable more to the large amount of personal attention devoted to each case than to any hypnotic influence."

The insane are not so susceptible to hypnotic influence as the hysterical. Hypnotism springs up, said Charcot, on hysteric soil. But in my opinion the hysterical are the persons on whom it ought not to be practised.

THE PREVENTION OF INSANITY.

The prevention of insanity is of far higher consequence than the cure, and it is a matter which concerns every medical man, whereas the treatment of the insane concerns only a few; the prevention, indeed, concerns not only every medical man but every member of the community. In an ideal society no insanity should exist, any more than it does in the simple society of the untutored savage; but in our day, when men live not for the good of the community, but for themselves and their own pleasure and gain, we are very far from arriving at such an existence.

In the ideal community, how would insanity be prevented? The first precaution, no doubt, would be the forbidding the marriage of unsuitable persons. If men and women were race-horses or shorthorns their breeding would be studied most elaborately, all imperfect or faulty stock would be carefully eliminated, and everything like inbreeding would, as a matter of course, be avoided. But, being what we are, thinking only of ourselves and our own gratification and nothing of the future race, we arrange our own unions, and nobody has the right or power or courage to prevent us when we arrive at that period of great discretion, the statutory age of twenty-one. So far from the community trying to improve the race by selecting the strong and rejecting the weakly, it does everything in its power to hide the latter and stifle all inquiry concerning their weakness. Parents will conceal the existence of hereditary insanity not only from the medical adviser but from the children themselves, and rather than expose or confess it, will subject them to infinite risks not only as regards marrying but in the general environment. Men and women who have been insane already, perhaps more than once, will contract marriage, and will not only not tell the other party of the fact of their having been insane, but will deny it stoutly when the question is asked. And when such women marry and have a child and break down again in

another attack of insanity, they will continue to bear children till they have a large family, and possibly a fresh attack of mania after every one. Many have hoped that some day legislation may concern itself with this subject, and prevent the union of persons one of whom has been insane or is specially threatened with the disorder. Our legislators, however, are far too busy with matters of less importance. We can only trust that by education, by continual ventilation of the subject, and exposure of the evils arising from its neglect, public opinion may in time be directed towards it so that people will be forced to look upon the act of giving birth to an insane child as a cruel sin. Such people probably flatter themselves that their children will not be insane because they may be acquainted with other families who have escaped, or they know familes in which one or more members have shown symptoms of the disorder and yet a larger number have escaped. But it is certain that every child whether it becomes insane or not, carries about with it through life a *tendency* to insanity, and there can hardly be a more terrible heritage. And it must not be forgotten that insanity is not the only result of an inherited predisposition; there is a long series of neuroses which may be developed in the children of insane parents, such as epilepsy, dipsomania, neuralgia, idiocy, and the like. People boast that there is no insanity when nearly all their offspring are the victims of one or other of these maladies.

For the prevention of insanity we would, if we could, forbid the marrying of unsuitable persons, persons who by reason of inheritance, or being themselves neurotic, unhealthy, or inebriate are likely to have diseased children. If there is insanity in the family we shall have to consider in how many members and how many generations it has shown itself. If it has occurred in one of the parents, what was the age of the parent at the time of its appearance? Did it appear when the parent was young, at a time when obviously it must have been inherited, or did it manifest itself later in life with a cause and a history which showed it to have been acquired? What was the age of the parent when the child was born, and was it born before or after the disorder commenced in its parent? If the taint appears to be slight and the individual is strong and healthy and free from all neurotic symptoms, we then have to look at the other side of the union, at the partner that he or she is about to take. If this one's family history is absolutely free from inherited disease, and the individual is sound in body, no great opposition can be offered if he or she is willing to take the risk, but that there is a risk ought to be clearly explained. On the other hand, if there is a taint of insanity on this side also, if the parties are cousins, or either is eccentric,

nervous, hypochondriacal, weak-minded, ultra-religious, or ultra-emotional, the union should be forbidden, not only on account of the offspring, but for the sake of the parties themselves. The effect of the knowledge of this family disorder may have a disastrous influence on their lives and cause the greatest misinterpretation of actions and trial of tempers.

Whatever difficulty we experience in advising as to the marriage of those in whose families insanity exists, there will be much less when we are consulted about men or women who have already had an attack of the disorder. When the individual is a girl, we are at once confronted with the popular and prevalent idea that marriage is a cure and sovereign remedy for such disturbance, and advisers, even medical, say to the parents, "Get her married," for they think that matrimony will cure all remnants of the past attack and be a certain preventive of any in the future. Our advice on this subject will be often taken and but rarely followed. The attack will be concealed from the knowledge of the other party, if possible, or will be minimized and spoken of as having been only nervousness or hysteria. In my opinion people who have been insane ought not to marry at all, or inflict on their partner for life the anxiety and danger of another attack. No one who has had one attack of insanity can be pronounced free from the risk of another, for it is a disease which confers no immunity in the future on its victims, like some others we have to treat. On the contrary, each attack, if there be more than one, adds to and does not take away the liability to others, in this respect following the example of its congeners, epilepsy and neuralgia. And besides the risk and danger to the partner in the marriage there is the question of offspring.. In this there is far greater danger for the woman than the man, for the former has to face the periods of pregnancy, parturition, and possibly lactation. Numbers we see breaking down after childbearing who, had they remained single, might have led a happy and useful life.

People with an inherited taint are continually marrying without advice, very often in spite of it, and when married, insanity is developed; they break down, recover perhaps, and break down again. The wife may have puerperal mania after one or more of her confinements, the husband may show symptoms of the disorder at an early period. Now, holding the opinion that I do very strongly as to the necessity of preventing the inheritance of insanity, I must say that in my judgment persons who have had an attack of the malady ought to have no more children. What can be more lamentable than to see a woman break down in childbed, recover, break down again with the next child, and so on with six, seven, or eight children, the recovery

between each being less and less, till she becomes a chronic maniac? For the sake of the mother and father, to say nothing of the children, there ought to be an end of the begetting when insanity follows the birth. The same observation applies to fathers who have had attacks of insanity. There is not the same personal risk to the father that there is to the mother, the risk of dying in an acute attack of puerperal insanity or of becoming through such an attack permanently insane; but there is the same risk for the children, the same chance of bringing into the world a progeny which shall hand down this heritage of insanity and all the other varieties of neurotic disease.

People, however predisposed, will marry, and very often marry cousins and others perilously like themselves. The result is a neurotic offspring, the bringing up of whom the medical attendant has to superintend as best he can. What is he to observe and what precautions can be taken? From the earliest age he may note symptoms which should put him on his guard. The infant may sleep badly, may be cross or overexcitable, or have infantile convulsions. If the insanity is on the mother's side, the child should not be suckled by her, for if she is a nervous and emotional person, prone to varying mental moods, she is not likely to be a good nurse, and it is of the utmost importance that a predisposed child should be thoroughly well nourished either by a good wet-nurse or by hand-feeding. Nourishment is most essential, and such a child is favorably situated if it is fat, and badly off if thin. This will depend not only on food but also on sleep. Of this it cannot have too much, and it should be encouraged to sleep as much as possible and at regular hours so that the habit may be engendered and continued, for this sleeping—sleeping by day as well as by night—should be kept up for some years, till it is five or six years old or even more.

Children who have plenty of food and sleep are not likely to be troubled by fits or convulsions, but if any should take place they are of grave import, and the cause should be carefully looked for and the recurrence if possible averted. Some nervous children are troubled with nightmare or night horrors or a fear of being alone or in the dark. All such require to be treated with great care, with judicious firmness together with kindness as far removed from cross scolding as from silly spoiling and petting. Many a child is frightened and rendered nervous and timid for life by tales told by foolish servants and nurses of ghosts, spectres, or robbers, or threats of policemen or the like. The sensitive and imaginative brain of the child carries to bed with it these terrifying romances and wakes from its too vivid dreams in an agony of panic. Parents are often little aware of what goes on in the nursery behind their backs, and what harm their children are

deriving from those in whose charge they are placed. Another evil, it is to be feared, comes occasionally from nurses, who in order to make such children sleep teach them habits of self-abuse.

While they are thus exposed to risks from nurses and servants, they may receive no less harm from parents if the latter are peculiar or extreme in their views, violent in temper or capricious. They may spoil them at one time by indulgence in improper food and drink, at another may frighten them by their own quarrels and noise, or dose them with religion till the children either loathe the very name of it or become the veriest little hypocrites. Dr. Clouston tells us of a little boy aged four "who by dint of constant effort on the part of his mother was so sensitive as to right and wrong that he never ate an apple without first considering the ethics of the question whether he should eat it or not; who would suffer acute misery, cry most bitterly, and lose some of his sleep at night if he had shouted too loud at play or taken more than his share of the cake, he having been taught that these things were 'wrong' and 'displeasing to God.' But the usual anæsthesia that follows too keen feeling succeeded the precocious intensity in this child, for at ten he was the greatest imp I ever saw, and could not be made to see that smashing his mother's watch or throwing the cat out of the window, or taking what was not his own, was wrong at all." [73]

The egoistic nature of those who inherit the insane diathesis has been already mentioned. All children are prone to egoism but especially these, and it ought to be kept in view in the rearing thereof. There is much in home life to encourage this selfishness. If it be the first or an only child, possibly delicate, it may require much watching and care, and it will be easy to foster this selfishness, and much caution must be observed to avoid so doing. The child should be thrown among others as much as possible, should be taught to consider its playmates first and itself last, to be generous and share with the others its toys and luxuries. It should learn to be kind and considerate towards servants, and to be fond of and not cruel to dumb animals. Cruelty to the latter is a constant concomitant of a weak mind. Very soon in the life of the child will arise the question of education on which our advice may be asked, especially with regard to two kinds of children, the backward and the precocious. The first may be not an idiot or imbecile but backward, slowly developing, slow to grasp that which he is taught, but often retaining it with great tenacity. Such a boy or girl requires special tuition. It is useless to place them in a class of others whom they resemble only in age, and expect them to do the same lessons and compete on perfectly equal terms. Still worse is it to

punish an unfortunate child of this kind for not learning his lessons, to set him down as lazy or idle, and to think that it is only obstinacy, the remedy for which is the cane. Incalculable harm may be done to a boy or girl by such a mistake. Special education and special teachers are required, and the latter must be persons who will not lose their temper but will with infinite patience bring forward what talent may lurk in the backward mind, and make the lessons a pleasure instead of a hated penance.

Many backward children have a special aptitude for some one pursuit, as music, drawing, carpentering, or even mathematics or mechanical engineering, and it is the teacher's business to discover this and develop it by every available means. On the other hand there is the precocious child, bright, quick and intelligent, apt to learn, the pride of his teachers. This precocity is often born of a neurotic stock, just as is the backwardness of the last mentioned, and it demands as much care. Teachers, especially in schools, are apt to press a child of this kind unduly; in the competition for places and prizes at school a boy or girl, even without pressure from masters or mistresses, may overwork its brain cells, and from being a genius at ten may become a dolt at twenty. Teachers have to watch closely over the health of such children and take care that they have sufficient and eat sufficient plain and wholesome food, that they sleep in a well ventilated and healthy bedroom, and that they take abundant exercise in the open air. There has been a good deal of controversy in England as to the propriety of making boys join in games in the playground, and not allowing them to "loaf" in their rooms or in the streets of a town. Whatever may be said of this compulsory play as a general rule, there are beyond question many of these peculiar, shy, and nervous children who would never play unless compelled, but would spend their time indoors to the detriment of their health, or among objectionable companions in taverns or the like. I have met within asylum walls in after-life more than one whom I recollect at school as loafing and idling in this manner, not stupid or neglecting his lessons but avoiding the playground and games, taking no exercise, and remarkable for some habit or peculiarity of appearance.

Are girls to be sent to school? Much will depend on the character of the home life and the judicious or injudicious management of the parents. School may be the salvation of some girls by taking them away from uncomfortable homes or foolish spoiling or petting, and subjecting them to the rules, discipline, and public opinion of a number instead of the self-indulgence of home life, the caprices of an hysterical, violent, and indiscreet mother, or the austerities of an

ultra-religious father. In the case of the majority of girls whose homes are bright and happy, it is better for them to be day-scholars rather than boarders. In a large day-school, such as we now have in most towns, there is an approximation to the broad views and high tone of our public schools for boys, and at the same time the girls enjoy the advantages of home life and of watchful care of health. For the period of school time is one of greater peril to a girl than a boy, inasmuch as during this she passes through the stage of puberty; the first appearance of the catamenia is fraught with considerable peril to a good many sensitive and nervous girls, and they should be sedulously guarded during it. They should not be allowed to over-fatigue themselves with tennis, long walks, or rides. They should not be exposed to great heat or cold, or anything which will check the menstrual flow or render it too profuse. They should not overtax the brain with studies for competitive examinations, and a strict watch must be kept upon their sleeping, as an inability to sleep in young people of such an age is often a warning and forerunner of coming mischief, and if a girl sleeps alone it may easily be overlooked. This time of life is one of greater danger to girls than to boys, to whom it makes comparatively little difference and who break down at the age of adolescence rather than that of puberty. A boy of twelve develops slowly and gradually, and is not a fully perfected man till he is twenty-five. But a girl of seventeen or eighteen is far nearer to a fully developed woman if we compare her with one of twelve, and as her time of development is crowded, so to speak, into a narrower space, so is it fraught with greater peril.

There is a matter of great importance in the life of boys and girls which cannot be passed over without notice. It is the subject of self-abuse. It is a habit learned in a very large number of cases at an early age; it may even, as I have said, be taught by nurses, but it is more likely to be derived from another schoolfellow, and this at a time when neither is old enough to know that it is likely to grow into a habit or be productive of evil, though they may be conscious that it is a practice which must be concealed as indecent and unclean. I am aware that there is great exaggeration as to the consequences and much nonsense talked with regard to the habit. Parents who wish to conceal the insanity which exists in their families are ever ready to assign self-abuse as the cause of an attack in one of their children, if it can be shown that the patient has ever indulged in the vice, no matter how rarely. Young men, too, when they hear, perhaps for the first time, that the practice is hurtful, become alarmed, and if by ill-luck they happen to come upon any of the literature disseminated by the vile tribe of quacks who prey upon the nervous and frighten

them with such hobgoblins as impotence or spermatorrhœa, the result may be very disastrous. The neurotic are those most likely to suffer from the habit and most prone to indulge to excess, and in some it may be the actual cause of insanity. It is almost certain that a boy will hear of it at school, and in my opinion it is not wise to allow him to run the risk of contracting the habit without having the slightest idea that it is harmful to health. It is better that he should be warned by a father, guardian, elder brother, or family doctor that he must on no account indulge in this vice than that he should take his chance of refraining therefrom. At a recent meeting of the British Medical Association (Bristol, 1894) there was a discussion on the subject of warning, and opinions were given for and against it. Since that date my own view has been confirmed by the headmaster of one of our chief public schools, who has requested the parents of the boys to take care that their sons are warned against the practice. The habit, if already contracted, should be strenuously resisted, and hard exercise, plain living, and the absence of stimulating food and drink and of improper literature should be carefully enforced. With girls it is different, and I do not think that there is any need to warn them; their chance of being taught the habit is far less, especially if during their education they live at home, and this is a strong argument in favor of the latter system. If they must go to a boarding-school the greatest care must be exercised in the selection, and that one must be chosen where such things do not exist. It has happened that girls have found out the practice for themselves, as they have told me, but I believe this to be rare, and no one would bring it to the knowledge of girls in general, because here and there one has made such a discovery. Such knowledge would in truth be a dangerous thing.

Looking at the history of so many of these predisposed persons and at the part which drink plays in filling our asylums, it surely is not too much to advise that all such should totally abstain from alcoholic liquors. Especially should those who are the children of intemperate parents, but this is not likely to be inculcated by the latter. Happy are the children who are not in their hands. I lately saw a young man aged twenty-four who was just emerging from an attack of delirium tremens, one of many from which he had suffered. He began to drink hard at the age of fifteen; his father and mother both drank themselves to death, and the son was following their example, and in England we have at present no law to prevent it. It is far easier to keep young men and women from beginning to take alcohol than to break off a habit once formed. They are not likely to indulge in other stimulants as opium, coca, or hascheesh, but a liking for wine or spirits may be contracted at an early age; the liking may grow into

a craving, and how hard this is to resist or overcome every medical man knows full well. Girls at the present time in great numbers are accustomed to do without beer or wine and in no way suffer from the deprivation; on the contrary, with plenty of food and exercise they have grown and attained a stature and muscular development which is very striking. With young men it is not so common, yet a considerable number abstain, and if the habit is commenced at an early age the difficulty vanishes. In fact, it is certain that apart from the question of drinking to excess, many of these neurotic persons suffer from various kinds of nervous dyspepsia, which are aggravated by alcohol and cannot be cured unless it is abandoned. If left to themselves they will probably fly to brandy to relieve dyspeptic pain and spasm, and instead of curing will increase their sufferings and so drift into the practice of constant stimulation. It is also important that in the choice of a calling for neurotic young men none should be chosen which entails a constant tasting of wine or spirits, or the entertaining and drinking with others such as is inseparable from some walks of life.

Equally important is it that the feeding as well as the drinking of the predisposed should be carefully watched. Stimulants in the shape of alcohol they do not require, but an abundance of plain, wholesome food is absolutely necessary, and many break down for want of it. It constantly happens that from hypochondrical notions about dyspepsia, from fancies of various kinds on the part of the parents or themselves as to what is or is not wholesome or what agrees or disagrees with them, or a fear which girls have of getting fat, a small and inadequate amount of food is taken, and certain important items are omitted. One cannot take bread, another milk or eggs, another potatoes or vegetables. So the diet list is reduced till little remains and that innutritious or indigestible. If this occurs in men who at the same time are hard worked in brain, a breakdown is very likely to follow, and it is often most difficult to induce them to take the amount of food which is essential for recovery. Another class thinks it carnal and sensual to indulge the appetite and eat one's fill, and endless evil comes to many who fast during Lent and other such seasons, and mortify the flesh according to the doctrines of an ultra-ritualistic party. Not unfrequently I have seen men and women who get up early in the morning to attend a celebration of the communion. This they feel themselves called upon to do fasting, and they rise and go out in all weathers and into a cold church without taking any food. The whole of the religious training of the predisposed requires the greatest care and judicious handling, and it is rendered difficult by the fact that such people are averse to consult those who can best advise them, and seek excitement and extreme views, ranging from re-

vivals up to the ritual of the Roman Catholic Church. Young people of either sex should not be allowed to spend an undue time in reading religious books, in private meditation, or in writing long accounts of their spiritual experiences. Their religion should be practical and not introspective, and they should not spend half the night on their knees, exposing themselves to cold.

The time has now arrived after boyhood and education are passed, when a young man has to choose a profession or occupation, and if he goes to college he will adapt his studies more or less to that which is before him. Be it remembered that the persons under consideration are the predisposed, those who inherit insanity or some other allied neurosis. We have not to do with men and women in general. The ideal life for any one predisposed is a home in a healthy locality free from overwork, over-anxiety, or worry, with sufficient means and few children, with everything, in short, that will repress the hereditary tendency and nothing that will excite it. But neither the young man himself nor his parents may aspire to such a life, but on the contrary desire something very different, and with the egotistic self-assurance that characterizes so many people of this temperament, he chooses some calling for which he has not the requisite ability, patience, or capacity, and failure and disappointment is the result.

What should influence the selection of a profession? Of the so-called learned professions the church is the least eligible; it appeals strongly to the emotional part of the mental constitution, the part which in neurotic people is apt to be easily and strongly aroused and least under control. Religious doubts and difficulties concerning creeds will probably arise in these excitable minds, questions as to whether they are fit and worthy to hold their benefices, or whether they shall resign them, and by so doing reduce themselves and their families to poverty. Fear may arise, in a vacillating and doubting mind, as to whether the duties of such a calling are properly discharged, and after the slightest depression there may be overwhelming religious remorse and probably suicidal attempts. Moreover, this profession once adopted cannot easily be thrown up or changed for another, so that it is by no means a desirable vocation for those whom we are considering. For the last reason law and medicine are preferable; the study of them, especially the latter, has great and practical interest for one who likes it, an interest which cannot flag, as new discoveries in science and new methods of alleviating disease are made and published. There will, of course, be anxieties in both professions. Lawsuits may be harassing and disappointing, and patients will die in spite of our efforts; at times business will be slack

and fees scarce, yet in the calling of a lawyer or a medical practitioner there is usually a livelihood to be earned, and a certain amount of routine and unexciting work to be done without much worry. Obviously it is not good for a nervous man to be engaged in commercial undertakings or speculations which entail great anxiety and are subject to wide fluctuations. Such a life requires strong nerves and a cool head, and those succeed who have these requisites, and those who have not are lost in the race. Nervous people are subject to alternating moods of depression and exaltation. In the latter they are prone to launch out into speculations and enterprises which more sober people would reject, and when this stage has passed and depression has succeeded, they will sell what they have got for less than its value and are at the mercy of those who work upon their fears. For such people some post is to be sought where there is regular work to be done without great responsibility, where the hours are short and holidays long, and where there is a fixed salary not likely to fail or to cause anxiety as to its continuance. Locality is of importance, for the extreme neither of heat nor of cold is good for such, yet even in the tropics there are healthy and unhealthy places, and the selection must be made with care. Moreover, it is not good for such an individual to be alone, as some are while tending cattle or sheep with no one to speak to, perhaps for weeks, but natives. I have known several break down in these circumstances.

When they have chosen a profession, or haply before, these predisposed young persons bethink them they must marry, and may become engaged before they have consulted either their parents or medical adviser. They become engaged first and ask advice afterwards, and the advice offered, if it is contrary to their wishes, is seldom followed. If we note the number of young men and women who break down mentally during the time of an engagement, immediately after marriage, or during the honeymoon, it is certain that all are fraught with danger to those predisposed to insanity by constitution and inheritance. That all persons who have had insanity in their families should abstain from matrimony is more than can be expected. Not only do these marry, but they are specially prone to make ill-judged selections. There seems a tendency among these neurotic folk to choose for their partners people of a like nervous temperament, and from a shyness which is characteristic and constitutional they often choose cousins whom they have long known in preference to strangers whom they know not and are too shy to approach. Needless to say the danger is increased if cousins from two families in which insanity exists intermarry and have children. This, however, happens but too frequently, and parents do not oppose such unions, because they

prefer to ignore the whole risk. They hope for the best or deny that the malady has ever existed, or invent excuses for the cases that have occurred, attributing them to sunstroke, to falls on the head, or to drink. If a member of such a family is to marry, it is important that he or she should be in good health, and marry one who is also in good health and has a good family record. If a girl is delicate and neurotic, she should not marry a very poor man and have the additional anxiety of poverty and the constant and daily obligation to deny herself and pinch and save for the sake of husband and children. The continual worry of small economies and the necessity of meeting small debts may break down one who in more affluent circumstances might have gone unscathed.

Another fertile source of insanity in women is continual child-bearing, one child following another in rapid succession. Many delicate women having no break or respite succumb to this strain, even those in whom insanity may not be markedly hereditary. The nervous system has no rest or chance of recuperation, and mental or lung disease, or both, is the result. I have not found that mere hysteria in a girl is followed by insanity after marriage, but here everything will depend on what is meant by hysteria, which is a name often applied to very pronounced and unmistakable mania. Many men predisposed to insanity may benefit greatly by marriage if they are so fortunate as to meet with a suitable wife. They may henceforth lead a more healthy and regular life, keep earlier hours, get more sleep, and have a confidante to share their troubles, to care for their meals and domestic comforts, and nurse and guard them. If on the other hand, marriage does not prove a benefit, or they are unfitted for it, it is a condition from which the unfortunate wife cannot free herself. An irritable or jealous man will quarrel more with his wife and behave worse to her than to any other being, and there is also the risk that the offspring may be idiotic, epileptic, dipsomaniac, or neurotic in some shape or way. The benefit to be derived from marriage by a predisposed woman is far less and the danger far greater. There is the marriage itself with all its trying surroundings in which so many break down. Then follow pregnancy and parturition, to recur, it may be, frequently. Even if there is immunity on the first or second occasion, insanity may be developed later on. Of one thing I am persuaded and I repeat it here. Persons, especially women, who have already had an attack of insanity ought to abstain from marriage, and the concealment of such a history from the other side is a most serious and reprehensible step. Also a woman who has had an attack of insanity after more than one confinement ought to have no more children.

To promote an interest in something besides self it is necessary that these people should have an occupation or object to engage their thoughts and distract them from perpetual self-contemplation, or the promotion and aggrandizement of self. While some have too much work and mind-toil, others have too little, and lead an idle, aimless life which either tends to bad and solitary habits and perhaps to drink, or fosters a habit of continual self-introspection and perpetual complaint that they are misunderstood. Now these idle people require occupation and work for their minds, and this should be found for them in some form or other, though it may not be easy to lay down a scheme which is applicable to all. They may be independent and have no need to work for a living; this has been the curse of many young men, but such should be encouraged to take up some pursuit, to study some branch of science, to devote themselves to the practice of art, to travel in foreign countries and study the fauna or flora of distant lands. Every such pursuit is an assistance to the neurotic and predisposed individual, and great will be the benefit gained from it. Not only ought the idle to have such occupation, the busy and hard-worked man should have beyond his every-day task some amusement, pursuit, or hobby to which he can turn as a relief from his daily round of business and find therein a food and rest for his mind. Plato knew the value of this, which he called a parergon or by-work, and of great value it is. A man's daily task, whether successful or not, may be a very monotonous and routine money-making affair, which is not enough to occupy a healthy brain, but yet at times will be anxious and worrying. It is good for that man to leave his business behind him at his office and devote his energy to something else at home. If we look through the lists of our learned societies, we shall find that they are largely made up of men who belong to them for mental refreshment and recreation, who are not professional scientists, but busy men engaged in active daily work—city men, solicitors, clergy, medical men—who in such studies distract their minds from business and occupy their leisure with different thoughts and investigations. How often, on the other hand, do we find a man break down, and hear that apart from his business he has no thought, no occupation, no mental amusement. He goes to business early and returns late, and the morning and the evening newspapers are all that he reads from Monday morning to Saturday night.

Can anything be done by a man or woman who has had an attack of insanity to prevent a recurrence thereof? In some cases the cause of the first attack may be obvious, and it may be possible to avoid it in the future if the patient can be persuaded to give up such a cause as alcohol; the difficulty is to convince a man of the necessity of ab-

stinence. The same with puerperal insanity; if women continue to have children, they must expect other attacks. Those who have succumbed to the heat of tropical lands must not return thither; if they do, in all probability they will again break down. But a great many become insane not from an obvious and preventable cause, but from an inherited instability of constitution which has been upset by something, probably of a trivial character, and is liable to be again upset by anything of the like kind. And if there should be two or three such attacks, a habit of recurrence may be established and they will occur again and again without our being able to assign any exciting cause. These constitutionally frail people require to be shielded beyond any others, but their nervous condition renders them liable to the changes and chances of this life, and mere trifles are magnified into mountains by the nervous man or woman. Their insanity is said to be due to some worry or disappointment, but on inquiry we find that the worry or disappointment is entirely of their own fabrication, and has arisen in their own brain subjectively without any objective existence.

Can a man or a woman do anything to ward off an attack of insanity either in the near or remote future? Much might certainly be done if the matter were properly laid before those who inherit the constitutional predisposition, or have already had symptoms or threatenings of the disorder. But who is to do it? The parents or near relatives are unwilling, for by so doing they have to reveal or admit their own history; medical advisers may not be consulted, and cannot without some opportunity broach the subject. But indirectly something may be done. We know that it is the peculiarity of the insane temperament to be wrapped up in self, to be egotistic, displaying self-feeling and subject-consciousness in all the relations of life. An excess of this, a rise beyond the normal level, constitutes an insane man. It should be the aim of every one who has to do with these persons to foster and encourage the opposite and higher sentiments, the "altruistic" as they have been called, or to induce them in every way to think of others rather than themselves. This self-feeling may be displayed in many ways. In religion they may indicate their vanity and self-esteem; they "are not as other men are," or they fast and make long prayers for what they think they shall gain by it in another life. Others devote their whole energy to the gaining of wealth in order that they may exalt themselves beyond their fellows. They work very hard, giving their whole time and thought to business, and if anything goes amiss, and they make a loss instead of a profit, they are in despair and it affects them in an extraordinary manner. Others from this love of money-making become extremely

penurious, and not only will give nothing away to those in need but will deny themselves in every way. All this self-feeling should be repressed as far as possible by friends and advisers, and in the case of the young by tutors and governesses, and the higher qualities of mind should be encouraged and strengthened.

We may or may not be at liberty to state the motive we have in inculcating such lessons, that it is to ward off anything like mental trouble; but if we can, it is better to do so, for it supplies an additional inducement to listen to our advice. It may be necessary also to warn persons against the acquisition of such habits as drinking or indulgence in masturbation, sexual excess, or anything which is injurious to health, as fasting on the one hand or overeating and irregular meals on the other.

Perhaps the most serious symptom of trouble coming in the near future is want of sleep. If a predisposed person loses his or her sleep, it must be looked to. There may be a cause; some worry or other has caused wakefulness, and this should be removed if possible, or rest and change of scene may restore sleep. It may have come on without assignable or removable cause, merely from some overstrain of the brain centres, and a few doses of medicine may set it right. Again and again it happens that a week's good sleep procured by bromide, chloral, sulphonal, paraldehyde, or the like will dissipate fears and suspicions, allay excitement and irritability, and disperse the threatened mischief. The most foolish prejudice exists against the production of sleep by such medicines, and there is often a difficulty in getting a patient to take them if he has been told that he will contract the habit, will never be able to do without them, and the like. Certain it is that if the sleeplessness goes on unchecked, very grave symptoms will arise, the threatened insanity will rapidly develop and will have to be dealt with in a very different way. I have seen so many cases of impending mental disorder arrested by such measures, and so many which have not been arrested owing to the foolish prejudices of the patient and those around him, that I have no hesitation whatever in giving this recommendation. All such medicines, however, should be given under strict medical supervision. Patients should not be allowed to take or increase them at their own discretion. The effect must be watched and the drug or the dose may require to be altered or even discontinued altogether.

THE INSANE AND THE LAW.

It is necessary to say something about the relation in which medical men stand to the law in cases of insanity. There are many questions whereon we may be asked for an opinion, but the three principal points we have to deal with are: 1. The sequestration of the person or property of an alleged lunatic. 2. The responsibility of a criminal alleged to be lunatic. 3. The testamentary capacity of an alleged lunatic. I must speak very generally on these topics inasmuch as the English statute law is not the same as that of the United States, but the principles of jurisprudence of the two countries are founded on the same basis and the application by American judges is not less advanced than that of our own.

The method of procedure to be followed when an alleged lunatic is to be placed under restraint varies considerably in different countries, as I believe it does in different States of the Union, and as it has in this country. One principle has always remained unchanged, namely, that a certificate must be signed by one or more medical men before a patient can be sequestrated. In the case of pauper patients in England one certificate is sufficient; in the case of private patients two are necessary. This has been the case from the beginning of lunacy statute law. In some places, I believe, but not with us, these certificates are in the form of affidavits and are sworn evidence. There is much less uniformity in the "order" or commitment which is based on these certificates. When I first commenced practice, this order could be signed by any relative or person having some connection with the alleged lunatic, but it was not necessary for him to have seen the patient. He might not know him by sight or ever have seen him in his life, though probably this rarely happened. Then by another statute it was enacted in 1862 that the person making this "order" of detention must have seen the patient within a month, and by the present law, the statute of 1890, the relative or friend does not make the "order" at all, but becomes the "petitioner" and must have seen the patient within a fortnight. He petitions a judicial authority, magistrate, or county court judge, who makes the "order" based upon the certificates of two medical men whom he names. Previous to 1890 the order in the case of pauper patients was made by a magistrate and the new act assimilated the two classes, and now in every case the order is made by a judicial authority, but in the case of private patients he is not compelled to see the alleged lunatic before he signs. The alteration in the law was a concession to popular clamor, as complaint was made that by means of two medical men who might be

ignorant or venal, an interested relative might shut up a person who being sane would be kept in confinement for an unlimited time by equally venal asylum physicians. Such a clamor was raised by a small knot of persons, most of whom had been in asylums, and as they thought unjustly detained, that in 1877 a committee of the House of Commons was appointed to hear their complaints. This committee sat for many weeks and investigated every case which could be raked up and brought before it, and heard every official and physician practising in lunacy, and in the end they failed to find a single instance of a sane person having been shut up and detained in a private asylum, and most of the complaints proceeded from those who had been confined in public institutions.

With legislation and its enactments I have nothing to do, but certificates of insanity have still to be signed by medical men, and there does not appear to be any probability of any change being made with regard to this. Indeed it is difficult to imagine that they can be signed by any other profession. For the diagnosis of insanity accurate medical observation and knowledge are necessary. We may see many who are suffering from the delirium of typhoid or some other febrile disorder, from narcotic poisoning, from acute alcoholism, from cerebral inflammation or meningitis, or some other acute disease in which the mind may be greatly affected. Who but a physician can say that such a case is not one of insanity and forbid its being sent to an asylum?

That some magistrate or other judicial authority should make the order for the detention of a patient I hold to be a distinct advantage, and it is probable that it will become the rule, sooner or later, in all countries. But this of necessity requires a certain time. Two medical certificates must be obtained given by two medical men who must have seen the patient separately. Then a magistrate has to be found and magistrates are not always at home. Meanwhile the patient may be very violent, very dangerous, very suicidal; or he may have had no food for a long time, and forcible feeding may be urgently demanded. A delay of twenty-four hours may result in death. Our legislature has enacted that in such a case an urgency certificate may be signed by one medical man and an urgency order by a relative or friend, and upon these the patient may be placed in an asylum and detained for seven days during which a second medical certificate and judicial order may be obtained. This emergency order and certificate I hold to be a necessity, wherever delay is likely to arise from the application to a magistrate. Some people are so distrustful of medical men and magistrates that they would like every lunatic to be brought before a jury and a regular trial held, as is done in this

country when there is a commission *de lunatico inquirendo*. Such a proposition is perfectly impracticable and ridiculous; the delay in placing patients in safety would be an insuperable bar, the expense would be enormous, many patients would be seriously damaged, and experience of the commissions held in this country has shown that a jury, made up as it often is of uneducated and crotchety people, is about as unfit a tribunal to decide a question of sanity or insanity as can be devised. About the insanity of nine persons out of ten there can be no doubt in the minds of any one. If that of the tenth is to be disputed, the decision should rest with a body of experienced officials like our Board of Commissioners in Lunacy, composed partly of medical men and partly of lawyers who are competent to deal with doubtful and difficult cases.

A family physician who has known a patient perhaps for years, and sees him or her altered in manners, habits, and disposition, has no difficulty in coming to a conclusion that the alteration is due to mental disorder. He is acquainted with the relatives as well as the individual, and is sure that their anxiety proceeds from a genuine desire for the restoration of health. But we are often consulted by strangers who invoke our assistance for the purpose of obtaining a certificate of the insanity of a person who also is a stranger, whom previously we have never seen or heard of. Here before we can make an examination of the alleged lunatic we must examine those who apply to us, and inquire and satisfy ourselves that their request is *bona fide* or based on sufficient facts. Will the restraint which is desired be for the benefit of the alleged lunatic or of the applicant? Are the facts related with regard to conduct true and the statement of them reliable? Are the so-called delusions really delusions? Sometimes one hears things so extraordinary that at first hearing they appear undoubted delusions and yet I have known them to turn out true occurrences. Who is the person who makes the application? Is it a husband or wife, or father or mother? Has he or she any interest in shutting up the individual beyond the latter's welfare? What are the pecuniary relations between the parties? We must inquire also whether there is any history of drink, and whether the excitement and violence which we hear of may not be due to alcohol. In this country there is no compulsory restraint of inebriates and hence arises a strong desire on the part of friends to bring such a habit under the head of insanity. We may also have an application made to us by friends of an alleged lunatic who take his part and think the allegation unjust. Such a person may be already in restraint, or steps are being taken to place him there, and we may be asked to give an opinion against restraint. These friends will try and explain away

all that is alleged as proof of his insanity; his delusions, if they have, as is common, an elementary basis of truth, will be said to be no delusions at all; his conduct, however extraordinary, will be set down as only eccentric; his violence will be said to be due to the brutal behavior of those about him, and if the patient is a woman it will be called "hysteria," and not insanity. The interference of irresponsible friends, or of parties who form one side of a family quarrel, is often most mischievous and very harassing to those who are doing the best for the patient's welfare.

It is sometimes said that we go with preconceived opinions if we examine an alleged lunatic after having heard all that can be said about him. This cannot be helped, for it would be useless and a waste of time to examine many unless we had information beforehand. One would be glad in every disputable case to hear both sides and to approach the matter wholly unbiassed, but this is not always possible. Before going into the presence of an alleged lunatic, we ought to find out as much as we can from as many people as we can, interested and disinterested, relatives, acquaintances or servants, and compare their accounts.

It has been said that we can form an opinion of a person's sanity or insanity by what he does, what he says, or what he writes; one may add to this his look or appearance, for not unfrequently he may be clothed or decorated in such a fanciful manner as at once to convince us of his insanity. Often the troubled and gloomy aspect will indicate the melancholia, or the gay hilarity of the general paralytic or maniac will almost without questioning denote the disease. But others will not show an emotional change and we shall have to cross-examine them and elicit if possible the morbid fancies which we call delusions. I have said already (page 75) that the delusions of the insane always concern themselves. We may talk forever upon other topics, the weather or the crops, or politics or the latest sensation in the newspapers, and, unless we bring the conversation round to himself, our labor will be in vain. We are often asked to go not as medical men but in some other capacity, or to go ostensibly to see some other member of the household. Many such schemes are only calculated to defeat their own ends, and many which have been inflicted on me have ended in failure. If we go to see some one else, we cannot suddenly turn away and commence to question the patient, and if he, upon our entry and assumed business with the other, gets up and leaves the room, we have no excuse for detaining him. But if we go as physicians, we assume the right of questioning him about his health, which we shall have heard is out of order, and about everything which directly or indirectly affects it, such as occupation, resi-

dence, mental work or worry, and habits. This will give us an opportunity of bringing in the subject of his delusions, whether they are gloomy or gay, whether he thinks himself the victim of plots and poison, the inventor of something wonderful, or the possessor of unbounded wealth. He may resent our questions and assert that some one else is his medical attendant and that he wants none of our advice, but we can assure him that we have come at the request of his family or medical adviser; we tell him that they have been alarmed at his symptoms, at what he has said or done or threatened to do, and this he must explain away or deny. And in his justification, explanation or denial he will generally open up the real state of his mind.

It is always satisfactory to discover delusions, for these, if they are really delusions, indicate a stage of insanity which is not the very commencement but one where perverted feelings and emotions have taken the form and shape of insane conceptions and ideas. But we must be sure that they are delusions, either because the statement is so absurd or impossible that it can be nothing else, or because we have trustworthy information from others of whose credibility we require no further proof. Such information requires to be well weighed, because friends, even those who are speaking perfectly *bona fide*, are apt to exaggerate, and to attach an importance to matters which are of little consequence, or they may themselves be speaking from hearsay and relate to us things which have been told to them, and are not accurate or are gross perversions of what has occurred.

We have far greater difficulty in the case of patients who have no delusions, but whose defence of their whole conduct is, so to speak, one great delusion, if they justify or explain it. Our difficulty here is that we seldom see their worst behavior, for they have sense enough to behave themselves decently in our presence. We shall tax them with what we have been told and this they will forthwith deny absolutely, or explain away matters which taken singly sound trivial, but taken together indicate the change which has come over the individual. It is as well to confront the informant and the alleged lunatic, if possible, and hear the latter's defence of what the other asserts; but very often the friends shirk this, and after telling us what they know or think, leave us to examine the patient alone. Sometimes when the disorder is advancing and growing from day to day, though there may be no delusions to-day, they may be present to-morrow or the next day. But in many cases in which insane conduct is the chief feature and the condition is chronic or stationary, there may be no delusions at any time, and it is a waste of time and patience to look for them. But we are not to pronounce the patient sane because we find none, but must try and discover other mental defects.

There may be great rambling and incoherence of thought; not incoherence of words, such as we find in the delirium of acute mania, but an incoherence and inconsequence of thought, which is quite incompatible with sanity or business capacity. The patient rambles from topic to topic, and do what we will, we cannot keep him to the point. If we ask him a simple question and ask it perhaps half a dozen times, we fail to get a plain and direct answer. If we question him as to the extravagance or absurdity of his acts, his dress or conduct, his answers may be ridiculous or childish, or he may treat the whole matter with a silly hilarity which sufficiently indicates the weakness of the mind. And we must consider not the wickedness or enormity of the conduct or acts, but the irrationality. We shall derive assistance also from the history of the case, from such origins as epileptic or epileptiform attacks, blows or falls on the head, or other causes of disorder. Nor must we forget to inquire as to the history of the family and the occurrence of insanity in any of its members.

We may have some difficulty in coming to a decision when we are examining persons who are demented, that is, whose minds are feeble and weak either congenitally or from disease or old age. The latter class are persons whose minds were once strong and healthy, but who from fits or drink, chronic insanity or age have become weakened in memory and understanding. Probably there are no delusions, but the chief symptom is a failing memory. They may be able to tell us all about their early life, but what happened yesterday or the day before has passed away. But all this is a question of degree. Can the patient recollect enough to take care of himself and his affairs? A man who forgets to-day what he did yesterday may be persuaded to sign some deed to-day and to-morrow will be entirely ignorant of what he has done. Such a person cannot be said to be able to take care of his affairs, but on the other hand he is not on that account a fit and proper person to be placed in an asylum, if his means allow of his living elsewhere. If he cannot recollect whether he has a wife or not, or how many children he has, clearly he is incompetent to make a will. But it all is a question of degree, and every case must be judged not by the laws of science but by facts and common sense.

Then there is the class of the congenitally weak-minded or imbecile, a class between idiots and the sane, most troublesome to deal with from every point of view. There will be no delusions and no loss of memory; on the contrary many of them have prodigious memories. But they are unteachable, untruthful, often vicious and depraved, destructive, cruel to children and animals, and without any idea of the value of money. Their vicious conduct we probably shall not see, and if we tax them with it they deny it. There are many

patients who can control themselves, behave properly, and answer rationally during the half-hour of our examination, and leave us in doubt as to what we are to say about their sanity or capacity to take care of themselves and their affairs. But if we lived with such people for a week, or even in many cases for twenty-four hours, and saw them, not on their guard but in their natural and genuine condition, we should have no hesitation in pronouncing them insane. The opinions of those who do live with such patients are of the greatest value, and should far outweigh those of physicians who perhaps have seen the alleged lunatic once or twice only for a short period.

I have said already that many patients from experience of their own or the hints of friends know very well what the delusions are of which we are in search, and know that it is for their interest that these should be concealed. They will tell us that they never had such fancies, or if that is useless, will say that they have given them up, and admitting they were delusions, will declare that they have entirely lost them, and wonder how they could ever have entertained such nonsensical ideas; and yet they may be possessed by them all the time. Very often in such cases we derive most valuable assistance from patients' letters and other writings. Many are fond of writing; they write to public officials, to friends, to physicians, and fill sheets of paper with statements of their case and grievances which may be purely imaginary. And thus, though they will deny everything to us orally, their papers indicate the presence of the old delusions. Conversation with others, as attendants or other patients, will sometimes have a like result. That which a man will deny to us he will talk of freely to his attendant, adding, it may be, an injunction that he is not to tell.

Feigned Insanity.

From considering people who try to conceal their insanity we pass to those who feign it. In this country insanity is feigned to escape from responsibility involving serious consequences, or to get a release from work in prison and better diet and especial treatment. The latter is probably the most frequent reason for such feigning. Abroad it is often assumed to avoid military conscription. The possible motive for feigning insanity should be borne in mind and the time at which the symptoms were first manifested must be carefully noted.

The great mass of malingerers being uneducated people without any knowledge or experience of insanity, the attempt will generally be clumsy and easy to detect; but here and there an educated man, or one who has had an opportunity of seeing the insane, may with greater success carry on the cheat.

The insanity simulated may be transitory or persistent. The individual will pretend or assert that he was in a delirious or unconscious state at the time of the committal of the criminal act, and profess that he knows nothing about it and is not aware that he ever did it. By this he virtually simulates the form of the transitory mania, which is occasionally seen as the outcome of an epileptic attack or as taking the place of the latter. Such attacks, however, are extremely rare, and are not usually so transient as to be unnoticed by others, or so severe as to take away all recollection of what was done in them. Here we must inquire into the previous history of the prisoner as regards former attacks of insanity, epilepsy, blows, or cerebral symptoms following drink.

We may be told by another that he suffered from an irresistible impulse to commit the act and from some sudden and overwhelming idea. He may simulate the so-called *impulsive* insanity, or he may allege a delusion and pretend that owing to it he was urged to the deed. In such cases other symptoms must be looked for, the past history, if possible, scrutinized, and the character of the deed considered, the motive or want of motive, its senselessness or eccentricity. Acts of violence towards self or others may be sought to be excused in this way and also acts of indecency, exposure of person or unnatural offences.

The cases, however, in which the feigned insanity is represented as transitory or past are rare in comparison with those in which conduct is displayed for our inspection. Now a real lunatic, when approached by a stranger, appears at first rather better than worse, and more on his guard; he tries to bring his wits together and understand what is going on. But a sham lunatic, when we go to him, redoubles his efforts to seem insane; he is more energetically noisy, idiotic, and maniacal. A sham lunatic always wishes to be thought a lunatic. If we ask him whether he is out of his mind, he tells us at once that he is—in fact, he dare not say the opposite. But a real patient rarely admits it, unless he be in the depth of melancholia.

Feigned insanity is almost always overdone. As there is no subject on which such erroneous notions prevail among people in general, so the imitation is, with rare exceptions, a bungle. If noisy, acute and violent mania is the form assumed, detection is easy. The malingerer, unlike the true maniac, will tire himself out and go to sleep. No sane person can maintain the incessant action, singing, and shouting of a genuine maniac for any but the shortest time. No genuine maniac would in the middle of all this, at an early stage of the attack, go to sleep and sleep many hours. If such people are watched without their knowledge, there will be little room for doubt.

If insanity without noise or violence is feigned, the sham lunatic usually pretends to have lost all reason, memory, and understanding. He will not give one correct answer to the simplest question; he will not know his own name but will display an ingenuity in evading answers and talking nonsense entirely at variance with the loss of mind he pretends to have suffered; or he will answer questions correctly about everything which does not concern himself, but so soon as we question him as to his crime or history, he becomes suddenly demented and entirely deprived of memory and intelligence. Dirty habits may be assumed to further the idea of dementia, but it is to be remembered that such dementia does not come on suddenly but is the result of organic disease or long-standing insanity. And it will often be found that casual remarks made in the hearing of such a person are heeded and acted upon, showing that the attention of this seemingly demented individual has been closely fixed upon all that has been going on.

A man may feign melancholy and sit silent and desponding, refusing to speak. He may refuse his food or say that it is poisoned. Slighter forms of melancholia may also be assumed, and if a great fear of suicide and suicidal impulse is pleaded we may have some hesitation in saying that it is feigned. There is sometimes a desire to gain admission into an asylum and slight attempts at suicide may be perpetrated to effect this object. Such attempts may easily be estimated at their proper value. But there may be some doubt and difficulty in the case of hysterical women who are on the borderland, whom some will deem hysterical and others insane. I saw a gentleman some time ago who had made several weak attempts at suicide, but whom I strongly suspected of shamming. He went afterwards to another asylum whence I believe he was discharged, but I heard afterwards that eventually he did commit suicide. There are others who are also on the borderland, the weak-minded criminal class in whom madness and badness are so intermingled that it is difficult to assign their proper place. Some are so violent, outrageous, and destructive, so silly in their motiveless fury and childish in mind that we may call them imbeciles or insane and have good grounds for our opinion. But these are not the people who feign insanity. It has been said that a prolonged assumption and pretence of any form of insanity will sometimes, in the end, really produce actual insanity. The reason, probably, is that the prolonged strain upon the mind needed to sustain the imposture is too great and causes it ultimately to break down. Whether in prison or in an asylum we shall have ample opportunities of watching a suspected malingerer. Various plans have been suggested for making such a person confess. Of these probably

the galvanic battery is the best and the most harmless. Certain medicines may have some effect or the threat of a cold-water bath or the actual cautery. But if upon careful examination we entertain no doubt as to the imposture, we do not need a confession to indicate the course to be pursued.

Capacity to Make a Will or Contract.

Mr. Renton says with regard to the testamentary capacity of the insane and their capacity to enter into contracts such as marriage, that "in each of these departments we find three, and the same three stages of development. At first, the question of capacity is treated solely as a question of fact, to be determined according to the ordinary rules of evidence. Then there comes an intermediate and metaphysical period, coincident in each case with a great advance in medical knowledge, and inspired by the idea that the mind being one and indivisible, and insanity being a disease of the mind, any derangement of the faculties must be fatal to civil capacity." This doctrine was laid down by Lord Brougham in the case of *Waring v. Waring* (1848), and was followed until 1870, being expressly recognized by Sir I. P. Wilde (Lord Penzance) in the case of *Smith v. Tebbitt* (1867). But in 1870 Chief Justice Cockburn remarked that both the above named were cases not of partial, but of general insanity with multifarious delusions of the wildest and most irrational character, abundantly indicating that the mind was diseased throughout; and in the celebrated case *Banks v. Goodfellow*, the Divisional Court of Queen's Bench held "that a jury should be told that the existence of a delusion, compatible with the retention of the general powers and faculties of the mind, will not be sufficient to overthrow a will, unless it be such as is calculated to influence the testator in making it."

This is the old doctrine of *partial* insanity, and it applies to the laws of contract and marriage. In these no man is counted a lunatic unless he is incapable of appreciating the nature and of passing a rational judgment upon the results of the particular act which is the subject of judicial consideration.

From this it is plain that at the present day every case, civil as well as criminal, in which insanity is set up must be tried each by itself according to its merits and the evidence adduced on either side, and not according to any doctrine, medical or legal. The mere existence of mental disease does not vitiate testamentary or contractual capacity, but it must always be remembered that it is for the person who sets up the testamentary act to prove that as a fact the delusions

or other unsoundness, though connected with the dispositions of the will, did not influence the testator's mind. It would not rest with the other party to show the contrary.[74]

To prove this negative, that the insanity did not influence the will made by an insane man, is a very difficult matter, and this was strongly put by a very eminent judge, Mr. Justice Hannen, for many years president of the Probate Court. In a celebrated case *Smee v. Smee* it was shown that the testator was a man of excellent business capacity, and had for some years held a high position in the Bank of England where it was his duty to attend to most intricate accounts and to make most delicate and minute calculations. Mr. Justice Hannen said: "The law on the subject is this. The fact that a man is capable of transacting business, whatever its extent and however complicated it may be, and however considerable the powers of intellect it may require, does not exclude the idea of his being of unsound mind. . . . A few years ago it was generally considered that if a man's mind were unsound in one particular, the mind being one and indivisible, his mind was altogether unsound, and that therefore he could not be held capable of performing rationally such an act as the making a will. A different doctrine subsequently prevailed, and this I propose to enunciate for your guidance. It is this. If the delusions could not reasonably be conceived to have had anything to do with the deceased's power of considering the claims of his relations upon him and the manner in which he should dispose of his property, then the presence of a particular delusion would not incapacitate him from making a will. But you should specially bear in mind that any one who questions the validity of a will is entitled to put the person who alleges that it was made by a capable testator upon proof that he was of sound mind at the time of its execution. The burden of proof rests upon those who set up the will, and *a fortiori* when it has already appeared that there was in some particular undoubtedly unsoundness of mind, that burden is considerably increased.

"This is an extremely delicate and difficult investigation and may be illustrated by reference to the physical world. There might be a little crack in some geological stratum of no importance in itself, and nothing more than a chink through which water filters into the earth; but it might be shown that this flaw had a direct influence upon the volume or color or chemical qualities of a stream that issued from the earth many miles away. So with the mind. Upon the surface all may be perfectly clear and a man may be able to transact ordinary business or follow his professional calling, and yet there may be some idea through which in the recesses of his mind an influence is pro-

duced on his conduct in other matters. You have to say whether or not the flaw or crack in the testator's mind was of such a character that though its effect may not be seen on the surface of the document before you, it had an effect upon him when dealing with the disposition of his property."

These are most important words, coming as they did from so eminent and experienced a judge as Sir James Hannen, a judge who leaned towards the upholding rather than the upsetting of doubtful wills. No doubt many chronic patients are perfectly able to make a will in spite of some delusions. If we know them well and know exactly the limit of their insanity, and how far it affects or does not affect their feelings towards their relations and knowledge of their property, we shall have no hesitation in giving evidence accordingly. But when the insanity is recent and ideas and feelings are changing every day, it will be difficult to say that a will made at such a time is not influenced by it. As Sir James Hannen said, an insane idea may affect the disposition of property, though apparently the flaw or crack is in no way connected with such a transaction. The connection or train of thought in an insane mind it is impossible to follow with certainty, or to test by the consideration of a sane mind. There is a case often quoted of a young man of imbecile mind who was passionately fond of watching windmills. His friends, thinking a change would be good for him, moved him to a place where there were no windmills. He set fire to the house and mangled and nearly murdered a child, not from pyromania or homicidal mania, but simply because he wished to leave his new abode and be sent back to a place where he could see windmills.

Lucid Intervals.

If the practice prevails in courts of law of considering every case separately according to the evidence adduced, apart from any theories of knowledge of right and wrong, or of general or partial insanity and the like, there will not be much difficulty in dealing with the question of lucid intervals. "If it can be shown that an act was done during a period when the testator's insanity was removed, or, in other words, during a lucid interval, the validity of such act will be established, notwithstanding the impossibility of showing the testator's general sanity. In other words, if it be established that the party doing the testamentary act, although habitually afflicted by a malady of the mind, has intermissions, and that there was such an intermission of the disorder at the time of the execution of the testamentary act, the general habitual insanity will not make the act in-

valid. But though this may be stated with perfect confidence as a preliminary axiom, it is by no means easy to say what exactly constitutes a *lucid interval.*" [75] As medical men we know that in alternating insanity (*folie circulaire*) and intermitting and recurrent insanity patients vary much at different times, and in the intervals are often comparatively sane and able to make a will. A man may not have recovered so entirely as to be precisely what he was before, or so that he can take care of himself and manage his affairs in all respects, but he must have at any rate for a sufficient time have regained a disposing mind. "He must understand the nature of the act and its effects, the extent of the property of which he is disposing; shall be able to comprehend and appreciate the claims to which he ought to give effect; and with a view to the latter object, no disorder of the mind shall poison his affections, pervert his sense of right or prevent the exercise of his natural faculties; no insane delusions shall influence his will in disposing of his property, and bring about a disposal of it which, if the mind had been sound, should not have been made" (*Banks v. Goodfellow*, 1870). Evidence to prove that the testator had such capacity must be adduced by those who set up a will.

Criminal Responsibility of the Insane.

The responsibility of the insane and the method by which a conclusion is to be arrived at—in other words, the legal test of lunacy—are subjects on which the legal and medical professions have disputed for many years. Lawyers are prone to suggest that the medical profession is anxious to excuse crime under the cloak of insanity, while the latter look upon the so-called legal tests of insanity, especially the right-and-wrong test, as antiquated, misleading, and contrary to fact. That there is this disagreement and confusion between the professions is principally due to the well-known answers of the judges given after MacNaughten was acquitted of the murder of Mr. Drummond on the ground of insanity. The majority of judges since that time, both English and American, have looked upon these answers as of binding authority and as containing the whole law on the subject. Other judges, however, have not taken this view, and have felt themselves at liberty to ignore such authority in cases in which they have thought right to do so. Chief Justice Sir A. Cockburn considered "that they only express so much of the law as was necessary to answer the specific questions which had been put to the judges." [76]

The important answer of the judges is that given to questions two and three, especially this part of it, "to establish a defence on the

ground of insanity, it must be clearly proved that at the time of the committing of the act the party accused was laboring under such a defect of reason, from disease of the mind, as not to know the nature and quality of the act he was doing, or if he did know it, that he did not know he was doing what was wrong."

I need not quote the whole of these answers, but may remark that one, and a very able judge, Mr. Justice Maule, dissented from them and gave answers of his own. Nothing further was done by the House of Lords after they were given, and we have not the authority of that House for saying that the one set of answers is more correct than the other.

The latest work on the subject which we have in this country is "The Insane and the Law," by Mr. Pitt Lewis, Q. C., Dr. Percy Smith, and Mr. J. A. Hawke, of the Middle Temple (Churchill, 1895) and the present state of things is very clearly put forward. The questions and answers, they say, deal with three subjects. They state (1) the legal position of persons who commit crimes while they are under the influence of insane delusion in respect of one or more particular subjects or persons; (2) the legal position of persons who commit crimes when they are "in other respects insane"; and (3) the proper mode of examining a medical witness in cases in which the issue to be tried by the jury is whether a certain person is, or was at a certain time, sane or insane.

The first of these subjects is considered by the judges in the first, second, and fourth of their answers, and the substance is that a person who commits a crime under a delusion as to facts, but who is not in other respects insane, is entitled to an acquittal when that state of facts would, if it really existed, have justified his act. In other words, it may be said that the insane are given no immunity on the state of facts supposed, which the sane, on the same state of facts, do not possess. Now the presence of delusion is but evidence of the existence of an unsoundness of mind which cannot be shown to exist only with regard to the particular subject as to which there are delusions.

The second subject is dealt with in the answer to questions two and three, a portion of which I have quoted. It is intended to be applied to all cases of insanity, not to cases only in which delusions exist. In *all* cases, say the judges, when the defence of insanity is set up, it must be clearly proved that at the time of the committal of the act, the accused party was laboring under such a defect of reason, from disease of the mind, as not to know the nature and quality of the act he was doing, or that, if he did know it, he did not know that he was doing what was wrong.

The "right" and the "wrong" spoken of here are *moral* right and wrong and not mere legal right and wrong. Everything in this answer turns upon the meaning of the word "*know*." The authors of the work above mentioned submit that this word "*know*" ought to be taken as implying the possession of a knowledge carrying with it a power of discrimination and choice. In Genesis we read that our first parents having a knowledge of good and evil which enabled them to exercise a choice, deliberately and intentionally chose the evil course. The judge in *Oxford's* case, Lord Chief Justice Denman, used these words: "A person may commit a criminal act and not be responsible. If some contributory disease was in truth the acting power within him which he could not resist, he will not be responsible." Many judges have enunciated views of the same kind, one recently affirmed that the responsibility of an accused person may depend upon the answer which must be given to the question "Could he help it?" "

For my own part I would say with reference to this knowing right from wrong, that there are degrees of such knowledge in the development and evolution of the brain and mind. My dog knows right from wrong. I can tell by his look when he has done wrong; he is conscious of it, and his look shows that he is. A child knows right from wrong; a child of six knows perfectly well that he ought to do this and ought not to do that, he looks for reward and fears punishment, but the law considers a child under the age of seven incapable of entertaining a criminal intent. An idiot, unless he be of the very lowest type, knows when he is doing wrong, and so does every patient in asylums, even the most demented, in fact asylums are managed by a system of rewards and punishments proportionate to the minds with which we have to deal. All these, animals, children, idiots, and insane, know right from wrong, and are responsible and liable to punishment each in his degree. Knowledge here is limited by the degree of development of the individual and responsibility is limited in the same way. The knowledge of a man who is proved in other ways to be insane must be looked upon as the knowledge of an imperfect mind, not on the level of ordinary unimpaired minds, but as having, to quote Lord Denman's words, "a contributory disease as the acting power within him," and as the knowledge is by the disease limited, so must be the responsibility and the punishment.

Let us now consider the views of American jurists on the subject. In an able paper published in the *Medico-Legal Journal* of March, 1889, J. Hugo Grimm, Esq., of St. Louis, Mo., reviews the practice of the American courts and tells us that by the law of England a person, although insane, is responsible if he knew "the nature and

quality of his act" or "that it was wrong," irrespective of what effect his insanity might have on his power of self-control. In other words, if one knows an act to be wrong, he must refrain from doing it, and he is not allowed to show that the insanity deprived him of his freedom of will. This, he says, is also the law in many, even the majority, of the American States. But a considerable number of the States admit evidence going to prove that although the accused had the capacity to know the natural consequences of his act, he yet was unable, by reason of disease affecting his mind, to desist from doing the act which was forbidden by law. The legal principle that when an act is done involuntarily—when it is not the free act of the accused—he is not responsible for it, is clear. The real question which lies at the bottom of this troublesome problem is, "What evidence is competent to show an absence of free-will?" The courts which refuse to admit evidence that mental disease can destroy the power of self-control irrespective of its effect on the intellect do so upon certain theories. The first is based upon a metaphysical notion as to the nature of free-will. The will, it is said, is always free to act whenever the mind can see the natural consequences of an act, even though the mind is diseased. This theory, however, is all but completely overthrown by the recent investigations of medical science.

Another theory is based upon considerations of public policy. It is said that though it could be positively shown that insanity did destroy the will while it left the intellectual capacity necessary to responsibility, such fact would constitute no defence whatever. With regard to this it may be urged that persons acquitted on the ground of insanity are not turned loose upon the community but confined in asylums. Also, the court would define the responsibility to the jury and determine what facts may be proved as showing the existence of disease, exactly as is done in a case in which they have to determine whether the accused "knew the nature and quality of his act" or "knew that it was wrong." The judge will direct the jury that to constitute a crime the accused must have had a criminal intent, and that if his mind was so affected by disease as to make it impossible for him to have had this criminal intent, he must be acquitted. But there is another element just as essential to crime, which is free-will, and how can courts refuse to instruct juries that if there is an absence of this free-will, there can be no crime. That free-will is an essential element of crime, and that it should be left to the jury to determine whether or not the accused suffered under such a degree of insanity as destroyed his free-will, was recognized by Chief Justice Shaw in the case of *Commonwealth v. Rogers:* he said: "If then it is proved, to the satisfaction of the jury, that the mind of the accused was in a

diseased and unsound state, the question will be, whether the disease existed to so high a degree that for the time being it overwhelmed the reason, conscience, and judgment, and whether the prisoner, in committing the homicide, acted from an irresistible and uncontrollable impulse; if so, then the act was not the act of a voluntary agent, but the involuntary act of the body, without the concurrence of the mind directing it."

Mr. A. Wood Renton, of the English bar, in an article published in the London *Law Quarterly Review*, and afterwards in the New York *Medico-Legal Journal* of September, 1890, says: "It may well be doubted whether the legal profession itself is fully alive to the radical change which has passed over the old law as to the criteria of capacity and responsibility in mental disease during recent years. The object of the paper is to set forth the chief incidents in this silent revolution as briefly and clearly as may be." He first treats of testamentary capacity and capacity to enter into contracts such as marriage, and then analyzes the law of criminal responsibility in mental disease. "The question is, what standard of criminal responsibility is now applied in cases of alleged unsoundness of mind? Owing to the absence of any adequate provision in our law for the review of criminal cases by a court of appeal, we have no authoritative judgment upon the subject to set side by side with such elaborate 'opinions' as that of Judge Somerville in *Parsons v. The State*. But every barrister who has gone on circuit knows that 'the rules in MacNaughten's case' are avowedly manipulated by judges, and, if need be, defied by juries, in order that injustice may not be done to the innumerable prisoners whose mental disease refuses to conform to any of the orthodox types, which alone are nominally recognized by English law. Even the inebriate, the *voluntarius dæmon* of Coke, who formerly had 'no privilege thereby, but what hurt or ill soever he doeth, his drunkenness doth aggravate it,' is now held to come within the meaning of the rule in MacNaughten's case, and to be irresponsible, if he did not know the nature and quality of his acts. Loss of self-control, resulting from any disease of the mind, is in practice regarded as a valid exculpatory plea. It appears, therefore, that there is now no standard, external to individual conduct, for determining the capacity and liability of the insane, and that the law knows but one test of lunacy, viz.: was the person whose act is in question able to understand its nature and to pass a fairly rational judgment on its consequences to himself and others; and was he a free agent so far as that act was concerned?"

That this is the test which medical men would lay down may be assumed without hesitation. I have quoted the opinions of lawyers

and not of medical men, as it is important to show that the legal profession is slowly following the lead and teaching of the medical. "English law," says Mr. Pitt Lewis, "is progressive, advancing with the times. It would be inconsistent with the whole of the history of the law of insanity, and indeed with the whole spirit of English law, to say that the growth of this branch of the law was suddenly stopped at any given point, and then became rigid and inelastic."

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IDIOCY.

BY

PAUL SOLLIER,

PARIS.

IDIOCY.

Definition.

The study of idiocy is replete with difficulties. The first which presents itself is that of definition, and the best proof of this is the multiplicity of definitions which have been proposed. This is due to the fact that idiocy is not a morbid entity; there is no "idiocy," and there are scarcely even any "idiots." Idiocy is the symptom of a large number of cerebral affections, and the term indeed means only a defect of intelligence, either congenital or dating from very early life. We have to seek a definition into which may enter all the elements, the totality of which constitutes the condition which is ordinarily so called. Let us pass in review the various definitions proposed by writers since the beginning of this century.

We can hardly regard as definitions the appellations given by the ancient writers to "idiotisme," as it was called before Esquirol's time. Such were: amentia, of Sauvage; imbecillitas ingenii, of Sagar; fatuitas ingenii, of Vogel; morosis, of Linné; innate dementia, of Cullen and of Fodéré; stupiditas, of Willis; etc.

The first true definition seems to have been that of Pinel: "a more or less absolute abolition either of the functions of the understanding or of the affections of the heart," a definition which may be applied equally well to dementia, with which idiocy was moreover confounded at this period.

Esquirol said that "it is a peculiar state in which the intellectual faculties have never developed," a definition which is inexact since idiocy is far from being always congenital.

Belhomme said also that "it is a constitutional state in which the intellectual functions have never developed or have not been able to develop sufficiently for the idiot to have acquired the ideas and the knowledge which education gives to other individuals placed in the same conditions as himself." Elsewhere he says that idiocy is properly "a state in which there is obliteration of the affective and intellectual faculties," and imbecility is "a state in which the faculties have developed only up to a certain point, whereby the individuals affected by it are prevented from rising to a degree of intellectual development to which those attain who, placed in the same conditions,

are of the same age and have the same sex and also the same fortune."

According to Séguin idiocy is "an infirmity of the nervous system the effect of which is to remove from the action of the will all or portions of the organs and faculties of the child, giving him over to his instincts and removing him from the moral world." This definition, which has philosophical pretensions, is entirely erroneous. Profound idiots have no instinct, and in any case it is not the loss of the will which makes the child an idiot, as Séguin affirms. He says, in effect: "The idiot enjoys the exercise of all his intellectual faculties, but he does not *wish* to apply them except in the order of concrete phenomena and only of such concrete phenomena as texture, form, savor, taste, sound, or such peculiar property (and which often he alone appreciates) which arouses in him a desire, a manifestation of intelligence or of life." According to such a definition an idiot would be an idiot by his own will.

Félix Voisin defines idiocy as "that peculiar condition of the mind in which the instincts of preservation and of reproduction, the moral sentiments, and the intellectual and perceptive powers have never manifested themselves, or that peculiar state in which these different inherent powers of our being, together or separately, are but imperfectly developed."

According to Marcé, it is "an arrest of development of the intelligence united to a congenital or accidental defect of the encephalon."

Kind, in the name of a committee composed of Cramer, Guttstadt, Ideler, Koch, and Koehler, proposed to the Congress of German alienists in 1891 the following definition: "Idiots are those subjects of mental disorder who have been deprived, either partially or completely, of intelligence or of reason at birth or in infancy."

The other definitions given by Griesinger, Delasiauve, Dagonet, Luys, Ireland, and others, more or less closely resemble those which we have just quoted.

According to Jules Voisin, "the idiot is an individual whose intellectual, sensory, and motor faculties have not developed or have developed abnormally in a defective manner, or have been arrested in their evolution before or some years after birth, to a degree which cannot be overcome, in consequence of fœtal or various other chronic lesions of the encephalon." This definition resembles closely that which I had myself previously given, in which are comprised the etiology, evolution, pathological anatomy, and symptomatology, and which I will repeat here rather more fully than on the previous occasion, as follows: "Idiocy is a chronic cerebral affection, congenital or acquired during infancy, with lesions of varied

sort but always of wide extent and often generalized, characterized by troubles of the intellectual, sensory, and motor functions, extending possibly even to the entire abolition of these functions, and by vices of organic conformation and arrests of development, and which owes its special character, as regards particularly the intellectual troubles, only to the young age of the subjects which it attacks."

Classification.

The classifications of idiocy are not less numerous than the definitions. Some are based on the psychic state in general or some special trouble of the intellectual functions, others of more recent date rest upon the pathological anatomy or the etiology. We will examine these in their historical order.

Esquirol, taking the condition of speech as a basis, recognized five degrees in idiocy and imbecility. In the first degree of imbecility the speech is easy and free; in the second degree it is less easy, the vocabulary is more circumscribed; in the first degree of idiocy, properly speaking, the idiot has at his command only single words or very short phrases; idiots of the second degree articulate only in monosyllables or cries; in the third degree of idiocy there are neither connected speech, phrases, words, nor monosyllables. This classification is insufficient. Idiots of the first category, which he calls imbeciles, are not imbeciles in the sense in which that term is understood to-day, but are rather curable and educable idiots. The second category comprises profound and incurable idiots. But more than this, speech cannot be taken as a criterion of the intelligence, for a very circumscribed lesion of the brain suffices to suppress the function of language, while extensive or disseminated lesions, which leave intact the speech centre, may determine the occurrence of very considerable intellectual disturbances. We have a clinical proof of this in comparing intelligent deaf-mutes with idiots, and also among idiots themselves, comparing the microcephalic, who are great chatterers, with the hydrocephalic, who are taciturn and often more intelligent.

Dubois, of Amiens, recognizes three classes: (1) Those who present the highest degree of brutishness and are reduced to automatism; (2) idiots who possess only instincts; (3) individuals who possess instincts and rational determinations, that is to say, imbeciles.

Pinel regards idiocy as a congenital disease characterized by moral and intellectual nullity, but presenting three very distinct varieties: (1) Brutishness, a condition of the most extreme human abjection, in which there are neither sensations nor sense of physical

needs; (2) stupidity, in which we find some perceptions and at least some sense of physical wants; (3) folly, a state which is distinguished from the two preceding by the presence of some fragments of intelligence, and especially by the possibility of speaking. As regards imbecility, he holds that it possesses an inverse character, that is to say, it affects individuals who have had reason, and that it is constantly increasing in degree.

Henke admits three categories, viz., stupidity, imbecility, and folly, which seem to correspond to profound and incurable idiocy, simple and relatively curable idiocy, and imbecility. Spielmann also recognizes three degrees, namely, the apathetic, the stupid, and the imbecile. Hoffbauer divides idiots into five classes.

Belhomme, finding the classification of Dubois too restricted, admits five categories. He accepts with Dubois two degrees of idiocy, viz., (1) profound or complete idiocy, in which the individual affected has not even the instinct of preservation, and (2) a state in which the individual has this instinct of preservation and eats like an animal—incomplete idiocy. Above these are the imbeciles, who may be divided into three categories. In the lowest of them are imbeciles who obey their instincts, their habits, and their organic needs without there being anything intellectual in their acts. In a higher class are those who are capable of manual labor and who may be improved by education. Finally, the highest class contains those individuals who act and reason like the rest of the world, but cannot be elevated to a normal intellectual plane. Belhomme, therefore, regards as idiots only those who are deprived of all intelligence and of all aptitudes. Jules Voisin does not accept this conception of idiocy, for he considers it as too restricted, while at the same time it makes too fine distinctions in the degrees of imbecility.

Félix Voisin gives the following divisions: 1. Complete idiocy, but rarely complete brutishness; there is only a vegetative existence. 2. Partial idiocy, in which the individuals are dangerous to themselves and to society, their lower instincts being fully and strongly developed, while the intellectual faculties and moral sentiments are scarcely existent in even rudimentary form in their make-up. 3. In this category are included the imbeciles who approach more nearly ordinary men, but still ought, as far as possible, to be placed beyond the possibility of doing injury or of disturbing society.

Griesinger admits of only two classes: (1) Grave cases in which intelligence is *nil*, and (2) light cases in which there is simply intellectual feebleness. This insufficient classification is completed by the statement that "in all cases of idiocy we may easily distinguish two fundamental forms, which in their extreme degrees differ considerably

one from the other, but which are often rather difficult to define with precision when the degeneration is not very profound; these are the apathetic (torpid, stupid) form, and the agitated, versatile form."

Séguin admits only one class of idiots, which he endeavors to separate from the backward, imbeciles, cretins, and the demented. The backward are normal children, but less advanced than other children of their age, both physically and psychically. Imbecility, he thinks, does not develop until between eight and fifteen years of age, and is then the consequence of a certain condition of the brain, of which the most frequent causes are onanism, intellectual overwork at the time of puberty, acute cerebral or intestinal affections, and injuries to the skull. This classification is absolutely incomplete.

Dagonet distinguishes four degrees, viz., (1) simplicity of mind, (2) the imbecility of Esquirol, (3) the idiocy properly so called of Esquirol, (4) the automatism of Dubois of Amiens.

Ireland approves of Esquirol's classification, but does not follow it, dividing idiots according to their mental manifestations as follows: (1) Those who can receive sensorial impressions, who have sensations which cannot arrive at perception (passive intelligence); (2) those who have also the power of comparing, of reasoning, and of drawing general conclusions (active intelligence); (3) those who can form abstract ideas.

Schüle distinguishes (1) absolute idiocy, and (2) imbecility, which latter he divides into profound imbecility, insusceptible of education, and imbecility of moderate and slight degree. In these latter categories he distinguishes the following clinical types: (*a*) Simple imbecility with apathy; (*b*) imbecility with ambitious delirium; (*c*) imbecility with cretinism; (*d*) imbecility with aphasia; (*e*) moral insanity, hebephrenic imbecility. He admits, in short, three great classes, viz., absolute idiocy, simple idiocy or profound imbecility, and imbecility properly so called.

Magnan divides idiots into (1) spinal idiots, (2) posterior cerebrospinal idiots, (3) anterior cerebrospinal idiots, and (4) anterior cerebral idiots. This classification, which rests upon a fantastic physiology and a pathological anatomy which does not exist, deserves mention solely as an example of the aberrations in clinical medicine to which one may be led by theoretical conceptions.

Jules Voisin, like the majority of authors, recognizes three categories, to which he adds mental weakness, which ought in my opinion to be classed separately. The following is his classification, which resembles closely that of Félix Voisin: 1. Complete congenital or acquired idiocy; this is incurable. It includes two degrees, in the first of which are the anencephalous and those who have not even the

instinct of preservation; in the second are those who have the instinct of self-preservation and certain habitudes. 2. Incomplete idiocy, either congenital or acquired; this is capable of amelioration. It includes several degrees, according to the existence, the absence, and the extent of certain intellectual, sensory, and motor faculties. 3. Congenital or acquired imbecility, characterized by a rudimentary existence of all the intellectual, instinctive, or moral faculties, by the perversion or by the instability of these faculties. 4. Mental weakness, characterized by a want of equilibrium or feebleness of the faculties.

From a clinical and practical point of view the element which enables the physician best to judge of the intellectual condition of an idiot or an imbecile, and of the chances of improvement which he presents, is the attention. I have not pretended, as some have made me say, that this is the keystone of idiocy, for sensation and perception ought evidently to preëxist; but attention is the keystone of intellectual development through education. In taking it as a basis of classification, we obtain the advantage of having at the same time a criterion for the prognosis and an indication for treatment. It offers us, furthermore, a most important element of differentiation between the idiot and the imbecile. I would therefore classify idiocy in the following manner: (1) Absolute idiocy—a complete absence and an impossibility of attention; (2) simple idiocy—a weakness and difficulty of attention; (3) imbecility—instability of attention.

All these classifications are essentially psychological and clinical, and consequently correspond to only one of the sides of the question. Therefore certain authors have endeavored to formulate a classification having a more precise basis, and to this end have taken into consideration either the pathological anatomy or the pathogenesis.

Morselli has made a classification of this latter kind. He distinguishes endemic idiocy or cretinism, and idiocy properly speaking, or imbecility. He then subdivides true idiocy according as it is congenital, hydrocephalic, microcephalic, convulsive, or traumatic—according, in a word, to the cerebral condition from which it proceeds; while imbecility is subdivided only according to its degree into complete and incomplete imbecility and simple fatuity. This classification, although interesting, is not complete and ought not to be retained, at least not in its present form.

Bourneville's classification rests solely upon pathological anatomy; he makes all the forms of idiocy conditions symptomatic of cerebral lesions. His classification, which I accept provisionally, seems to me the most complete. It is as follows: 1. Idiocy symptomatic of hydrocephalus (hydrocephalic idiocy); 2. idiocy sympto-

matic of microcephalus (microcephalic idiocy); 3. idiocy symptomatic of an arrest of development of the convolutions; 4. idiocy symptomatic of a congenital malformation of the brain (porencephalus, absence of the corpora callosa, etc.); 5. idiocy symptomatic of hypertrophic or tuberous sclerosis; 6. idiocy symptomatic of atrophic sclerosis—(*a*) sclerosis of one or both hemispheres, (*b*) sclerosis of one lobe of the brain, (*c*) sclerosis of isolated convolutions, (*d*) shagreen sclerosis of the brain; 7. idiocy symptomatic of meningitis or of chronic meningoencephalitis (meningitic idiocy); 8. idiocy with pachydermic cachexia or myxœdematous idiocy.

This classification has the advantage of great distinctness, and when the day arrives in which we shall have determined with precision the symptoms which correspond to these different lesions, it is to one of this kind alone that we shall turn. The others will serve only to indicate the degree of the symptomatic idiocy.

There yet remains to be considered a final question which is of great importance, namely, the relation which exists between idiocy and imbecility from a nosographic point of view. All authors regard these two states as two degrees of one and the same affection. There is, however, a difference between idiocy and imbecility, which is not only psychological but which has a bearing upon the sociability of the patients and even the nature of their malady. From a psychological point of view one single characteristic is common to them, that is to say, their inferior intelligence; but they differ absolutely as regards the disturbance of attention which they possess. In the idiot there is an absence or weakness of attention; in the imbecile there is instability of attention. From this arise considerable differences in their aptitude for education and in their relations with those about them. From a social point of view we may say that idiots are extra-social, while imbeciles are anti-social. This distinction, which is important as regards the manner in which they are to be treated, appears to have been admitted rather generally by writers of the present day since I proposed it. We shall see its justification later. The difference between idiocy and imbecility is no less distinct in its clinical and anatomicopathological relations. If we compare the children clinically called idiots with those simply denominated imbeciles, we are struck with a great number of physical infirmities in relation to the cerebral lesions with which the idiots are affected, while imbeciles have scarcely any such, or at most only more or less well-marked physical stigmata of degeneration. This difference in the general development and in the vitality of these two classes of patients is borne out by the mortality. In examining the statistics of deaths which have occurred during the last twelve years among the idiot and

epileptic children in the Bicêtre, I have noticed that, leaving the epileptics out, the mortality is considerably greater than that of imbeciles. There is also a difference in the age at which these patients die. While the deaths among idiots occur usually below the age of twelve to fifteen years, those among imbeciles hardly ever occur till after sixteen. While many idiots, like dements, die of consumption or of complications due to defective functioning of their organism, imbeciles succumb to intercurrent affections. The duration of life of idiots approaches very closely the survival of dements after the beginning of their cerebral lesions, while the average life of imbeciles does not seem to differ greatly from that of normal people. We find a very natural explanation of these facts in the anatomical examination of the nervous centres of these two types of individuals: all idiots present cerebral lesion, while imbeciles have none.

Bourneville and Morselli have implicitly recognized this fact (without, however, seeming to be impressed by it), in that they make no allusion to an anatomical basis of imbecility, while they found upon such their entire classification of idiocy. The reason of this naturally is that they discovered no cerebral lesions in true imbeciles.

Imbecility appears to us then as a mental affection, due probably to a constitutional trouble, but not to an organic lesion of the nervous centres. It constitutes the lowest degree of mental debility, to which it is closely related from a psychological point of view, and forms a type apart in the class of degenerative psychopathies. Idiocy, on the contrary, is not a morbid entity; it is only a symptom of an affection of the nervous centres originating at an early age or during intra-uterine life, and it owes its special characters only to this etiological circumstance.

I feel justified, therefore, in concluding that idiocy and imbecility are two absolutely distinct things, from the psychological and social point of view as well as from the clinical and anatomical. Until we have learned to diagnose the cerebral affections of infancy which cause idiocy, we must reserve the epithet of idiots for subjects in whom the intellectual troubles are accompanied by disturbances of general physical development, by motor or sensory disturbances, or when idiocy has developed in consequence of a cerebral affection, either primary or as a complication in the course of some disease. However slight may be the intellectual insufficiency in these cases, we cannot apply to it the qualification of imbecility, which should be reserved for cases of simple mental debility sufficiently marked to hinder the subjects from filling their social rôle.

We shall now study especially idiocy, and imbecility only by way of comparison with it, in order to show clearly the differences of these

two conditions, which really have nothing in common except intellectual inferiority.

Etiology.

The causes of idiocy are of two orders: Hereditary, general, and predisposing; and accidental, local, and determining.

Nervous heredity shows itself in a characteristic manner in idiocy, either directly or indirectly. When it exists almost alone as an apparent cause, the defects which we find in the ascendants are always grave. There does not seem, however, always to be a clear relation between certain organic or functional nervous affections or mental troubles and idiocy. We find ourselves in the presence of ordinary degenerative causes on which we need not here dwell.

But there are other general causes which may increase the hereditary degeneration or may in a measure create it. These are various forms of intoxication from which the parents may suffer, especially alcoholism; this is one of the most frequent and important factors in the etiology of idiocy, as also in that of epilepsy, two affections which are frequently associated. Alcoholism acts not only when it has become chronic in the parents or one of them, for there are some very clear cases showing that idiocy may result when conception has occurred during the drunkenness of one or the other parent. I believe, indeed, that alcoholic intoxication is the most powerful cause of idiocy and epilepsy, and that it may act alone or in conjunction with a nervous heredity or other degenerative causes. Certain other intoxications may produce an analogous result, especially when they affect the mother; such are lead and sulphide of carbon poisoning.

Various other conditions on the part of the parents have been spoken of as causative of idiocy, but their influence is very slight, if, indeed, it exists at all. Such are consanguinity, inequality in the ages of the parents (either a considerable difference between the ages, or the husband younger than his wife), and mental worry or physical distress at the period of conception. None of these causes is of sufficient weight to demand our consideration. Indeed, apart from profound degenerative taint and alcoholism, which may by themselves cause idiocy, or rather provoke the lesions upon which this condition depends, we need lay little stress upon the numerous other causes which have been alleged to exist, but which have no value except as they are associated with the efficient causes.

The accidental determining causes seem to me much more important and more precise. In order to study them we have only to follow the evolution of the child from the moment of conception. We have thus to examine into what has taken place (1) during intra-uterine

life, (2) at the moment of birth, and (3) after birth during the first years of life.

1. *Intra-uterine Life.*—The physical and moral condition of the parents at the moment of conception has a great influence. Thus we sometimes see a child, conceived during convalescence from a grave and debilitating disease, born an idiot. We have referred above to the consequences of alcoholic intoxication at the moment of conception. The moral condition is no less important, and it is not rare to see women who have conceived as a consequence of rape, which caused in them a violent emotion, or who at the moment of conception felt a distaste for the act or were in an irritable frame of mind, give birth to children who are either congenitally idiots or fall into this state soon after birth.

During pregnancy the physical and mental condition of the mother has, we may well understand, a no less marked influence. Severe and intractable vomiting, which moreover scarcely ever occurs except in very nervous patients, general diseases, such as typhoid fever, the eruptive fevers, or influenza, or even repeated syncope, may so disturb the evolution of the fœtus as to cause idiocy. Among the general diseases is especially to be mentioned syphilis, the mode of action of which is as yet not well understood. Some writers see evident proofs of hereditary syphilis in medullary lesions, such as those of Little's disease or of other spasmodic paraplegias, and in certain dental changes. But it is remarkable to note the silence maintained on this point by the immense majority of writers who have occupied themselves especially with idiocy. I myself, while endeavoring to elucidate this question of the rôle of syphilis in the production of the cerebral lesions which cause idiocy, and having sought for evidences of the disease with the utmost possible care, have been struck with the rarity of cases in which it has been encountered, and, indeed, I have never seen it as the sole cause of idiocy. No doubt the difficulty of making a positive diagnosis of syphilis in the mother is very great, and on the other hand we do not yet know all the forms which hereditary syphilis may assume when it affects the central nervous system. But, in spite of these reservations and admitting that a certain number of cases may be associated with symptoms of hereditary syphilis more frequently than we think, it is none the less evident that syphilis plays an extremely restricted rôle in the pathogenesis of idiocy. We have another proof of this in the rarity of hydramnios, which is only exceptionally encountered in association with hydrocephalus.

Traumatism is a factor of great importance, for it is not rare to see idiocy produced by some injury. We must distinguish between the traumatisms to which the fœtus may be exposed, those which act

on it directly, either acutely or in a continuous manner, and those of which it experiences, as it were, only the *contre coup*. Blows on the abdomen of the mother, falls, jolting in a carriage or in the railway, or violent efforts at lifting sometimes provoke abortion; and it need therefore not be surprising that when abortion does not occur they may cause profound disturbance in the growth of the fœtus. The experiments of Dareste and of Féré on the artificial production of monsters give us the key of the mechanism by which these traumatisms may cause idiocy. A frequently repeated traumatism, which, although not very violent, is no less serious because of its long continuance, is the compression of the abdomen which some women exert in order to conceal as long as possible the fact of their pregnancy or even at times to interrupt it. In this class of cases also we must consider the attempts at abortion, either by direct action upon the uterus or by the ingestion of certain substances regarded as abortifacients. Jules Voisin has reported a case of idiocy resulting from the compression caused by a second child in a case of twin pregnancy.

Emotional disturbances possess an importance upon which I insist the more because many authors have a tendency to regard their influence as an illusion and a popular fallacy. We may, however, regard them as veritable moral traumatisms, and, like physical traumatisms, they may act in two ways, either suddenly or continuously. Violent moral emotions in the mother during pregnancy have an indubitable action upon the evolution of the fœtus, and this action is all the more marked as the emotion is more violent and especially when it is produced at a period but little remote from the time of conception. This emotion must have a certain intensity, as, for example, it must induce in the mother a syncope, a nervous crisis, or a more or less prolonged tremor; it must, in a word, be accompanied by physical phenomena and rather marked physiological troubles. Fixed ideas, phobias which may come on during the course of pregnancy, may act in the same way as violent and sudden emotions when they have as their object the constitutional state of the child which is to be born. In both these cases we may note changes in the signs of life of the fœtus. Following strong emotions it is not uncommon to find the fœtal movements arrested; in the case of obsession or fixed ideas there is often great irregularity in these movements, and if the mother has already had children she is able to perceive very clearly the difference in the child's movements.

These different causes do not act through the same mechanism. When the mother is affected with a general disease (infection or intoxication), this reacts upon the fœtus, who, in consequence of the impressionability of his organs in process of development, offers but

a very feeble resistance, and it is therefore not surprising that the nervous system should be changed in a manner which may be irremediable, and this the more as the fœtus is younger at the time the disease occurs. When there is a direct traumatism the cerebral lesion may be explained in the same way as during extra-uterine life. But when we have to do with a permanent compression, it is probably to circulatory changes that we must attribute the organic alterations. There is, furthermore, in my opinion no doubt that we must lay to the account of circulatory disturbances in great measure the idiocy which follows violent emotions during pregnancy. We know, indeed, what influence the emotions have upon the general circulation, and we know also that it is the part of the body which is the object of an emotional preoccupation in which the vasomotor and circulatory modifications are most evident. In the case of a violent emotion causing a syncope, for example, it is probable that the changes of the nervous centres result from the disturbance of nutrition caused by the rapid and exaggerated flow and reflow of the blood in the fœtus. In the case of an obsession of fixed ideas having regard to the structure of the child to be born, the persistent vasomotor troubles result in a defective development which is not general only but often partial, and it is thus that we frequently meet with malformations resulting from a fixed idea in the mother, on the condition, of course, that the obsession occurs during the period of development of the malformed part.

The diseases of the fœtus are also frequent causes of idiocy. Unfortunately it is very difficult, if not impossible, to diagnose them at the time of their occurrence. A cardiac affection or an arteritis occurs more frequently than is usually supposed; cerebral hemorrhage, softening, or various inflammations of the brain or of its meninges are not rare during intrauterine life.

Most frequently the etiology is extremely complex; nervous heredity, emotions, and traumatisms are combined one with another, and the cases in which we can refer the idiocy very clearly to one or the other cause are relatively rare.

2. *The Moment of Birth.*—Various causes may act at the moment of birth which in themselves are capable of producing idiocy. There are probably in these cases more or less prolonged circulatory disturbances leading to alterations in the nerve cells or to cerebral traumatisms. Nothing is more common than to meet among the causes of idiocy prolonged labor or winding of the cord around the child's neck. The use of chloroform has been incriminated, but it is seldom given except in cases in which labor for one reason or another cannot be normally concluded, and it is therefore difficult to determine what

part this plays in the etiology. In any case the instances are very rare in which this factor could come into play.

The use of the forceps is much more common, and we can well understand that cerebral lesions, sometimes of an incurable nature, may be so produced. There is an etiological factor to which I wish to direct attention, for it has not been sufficiently insisted upon, although its importance and its frequency appear to me to be considerable. I speak of asphyxia during birth. Whether this asphyxia be due to the winding of the cord around the child's neck, to delay in labor during the passage of the head, or to no apparent cause, it is met with too frequently, in a proportion much higher than that in which it is encountered in the history of normal children, to permit us to disregard it as an important element in the etiology of idiocy. I have sometimes encountered it as the only cause to which the idiocy could be attributed. But whether it is isolated or associated with other causes, it is none the less interesting, for it reveals a quite serious disturbance of vitality of the fœtus, and whether it be a consequence or a cause, its relations with the development of idiocy are in my opinion no less evident and very close.

3. *Post-Natal Causes.*—It is rather difficult to say whether acquired idiocy is more frequent than the congenital affection, or the reverse. The exact beginning of idiocy is, in fact, a most difficult thing to determine. It has, however, seemed to me that congenital idiocy is the more frequent, and that the convulsions which are often seen very early in the life of the child, and to which idiocy has been attributed, are frequently the consequence of the cerebral alterations which in their wider spread will bring about the condition of idiocy. The convulsions which are met with in nearly all idiots during the first years of their life are often also caused by the inflammatory or necrotic lesions of the brain or meninges. In these cases the child was normal up to a certain age and might have developed intellectually like other children, but from this moment all development ceases and all that has been acquired is lost. The child is then not only an idiot, but a dement, which justifies the definition that I have given above of idiocy. The idiots of this category have certain peculiar characters which we shall have occasion to examine later. Primary meningitis or that of infectious origin occurring during the course of certain general diseases, such as typhoid fever, the eruptive fevers of childhood, etc., especially meningoencephalitis, is a very common cause of idiocy.

There may exist various accidental causes, such as falls on the head or extreme compression of the head, which was formerly and still is among certain peoples a general custom. Lesions which produce epilepsy in young children also cause idiocy, whence the frequent

association of these two affections. Finally, we have to notice the pachydermic cachexia which leads to a special form of idiocy, pachydermic, myxœdematous, or cretinoid idiocy, as it has been called.

Pathological Anatomy.

The pathological anatomy of idiocy is far from being settled, but its study is well worthy the attention of histologists, for there are certain lesions which are scarcely ever encountered in other affections and which would throw much light upon the alterations which the cerebral substance may present, all of which are certainly not yet known, and at the same time it would furnish valuable indications as to the development of the nervous centres and the respective functions of the brain and of the cord. Unfortunately we have accounts of investigations only in isolated cases, and the pathological histology yet remains almost entirely to be done. Even the gross lesions encountered in idiots have not yet been studied definitely in various treatises. We shall try to review the subject in a definite manner, following the natural order in which an autopsy is made.

The skin of the cranium presents great variations in thickness, and I have observed that this is generally in relation to the thickness of the skull, it being ordinarily quite thin in the hydrocephalic, and thick in the microcephalic.

The cranium itself presents certain peculiarities worthy of note. Sometimes there is complete ossification with premature union of the sutures, which indicates a complete arrest of development of the cranium and consequently of the brain. This is what is seen, for example, in the microcephalic, but the same peculiarity is often seen also in idiots with cerebral atrophy. More commonly it is a persistence of the fontanelles which is observed, not only of the anterior fontanelle, which is always persistent in myxœdematous idiots and is present for a long time in the hydrocephalic, but also the posterior and lateral fontanelles. In these cases Wormian bones are frequently seen in the widened sutures. In examining the bones by transmitted light we find spots of sometimes very marked thinning of the skull which do not correspond to any particular point, being irregularly distributed. The skull is generally universally thin in meningitic idiots, and sometimes remarkably so in the hydrocephalic and the myxœdematous, in whom it is sometimes reduced to the thickness of a sheet of parchment. The markings of the arteries are generally very faint on the internal wall, and we are able to see even more clearly than in the living the asymmetry of the two sides.

We often experience great difficulty in detaching the vault of the

cranium after the bones have been sawn through, by reason of the adhesions between the dura mater and the cranium, and these adhesions are sometimes so firm that we are obliged to cut through the dura mater before we can remove the cranium. This membrane is commonly thickened, and its adhesions probably point to old inflammatory states; it is often, indeed, in idiocy resulting from cerebral sclerosis or from meningitis that we observe this condition. Inspection of the base of the skull, after removal of the brain, enables us easily to recognize the more or less marked asymmetry in the orbital, the sphenoidal, and the occipital fossæ. It is not rare to find a deviation and an asymmetrical malformation of the occipital groove. This asymmetry is observed especially in cases of idiocy following cerebral sclerosis, porencephaly, or hydrocephalus. We may also note anomalies in the crista galli and in the sella turcica. There is often a change in the amount of the cerebrospinal fluid, which is more or less increased in cases of hydrocephalus and diminished in certain cases of sclerosis or of meningoencephalitis.

Before removing the meninges it is well to examine the under surface of the brain. We frequently notice a difference of volume in the vessels and nerves of the two sides of the base of the brain and in the cerebral peduncles, those being the larger which are on the side of the least altered hemisphere. This being done and section of the two hemispheres being made, we notice very often a difference in weight of the two hemispheres, a difference amounting sometimes to more than 200 or 300 gm.—as, for example, in cases of hemispherical unilateral atrophy or even of porencephaly. But even when these conditions do not exist, when there is a lesion of considerable extent involving one hemisphere only, it is important to weigh the two hemispheres, for that often gives us the first information of lesions which must be searched for in successive sections, such as certain subcortical cerebral cysts. In its gross weight, the brain including the cerebellum is very often below the average. Instead of 1,350 gm., which is the average weight of the brain of an adult, we scarcely find a weight of 1,200 gm. in an idiot of the same age. There are, however, certain rare cases on record in which there was a general hypertrophy of the brain, macrocephaly, with increase in weight of the encephalon, even up to 1,500 gm. The asymmetry and consequent difference in weight do not affect the hemispheres solely, for they may be found in the cerebellum, the bulb, or the pons, by reason of special lesions having involved one or other of these portions of the encephalon. These parts ought, therefore, to be examined and weighed separately.

After the brain has been removed from the cranial cavity, we must

strip it of its membranes in order to study its morphology and determine what cortical lesions it may present. The pia mater often has opacities, and is more or less thickened, especially in case of meningitic idiocy or that following cerebral sclerosis. It is much more common, however, to see it thinned than thickened, and this thinning may be so extreme, as in certain cases of hydrocephalus or of meningoencephalitis, that it becomes almost impossible to seize the membrane in order to remove it. The removal of the cerebral meninges is usually a matter of the greatest difficulty, and often even impossible in many cases of idiocy, by reason either of their extreme thinness or of the presence of numerous adhesions.

The brain is extremely distended in hydrocephalus and is sometimes reduced, at the level of the ventricular walls, to a thin layer of nerve tissue forming one piece with the pia, from which it is impossible to separate it. The same condition is usually present in myxœdematous idiocy. In cases of meningoencephalitis the adhesions are sometimes so firm that each strip of pia which is removed pulls with it part of the cerebral cortex. These adhesions are very irregularly disposed, being most frequently in the motor regions and in the parietal lobes, and but rarely over the frontal lobes.

The meninges are quite commonly injected, but it is often difficult to say whether this increased vascularization should be referred to the idiocy or to the disease which has caused death. No particular importance is to be attached to it.

The coloration of the brain substance offers some very interesting peculiarities. Pale in hydrocephalus, it presents a salmon color in meningoencephalitis, and a grayish-white appearance in atrophic sclerosis.

The morphology of the convolutions is interesting to study, as regards both the individual convolutions and the topography of the brain in its entirety. The convolutions are sometimes more or less extensively soldered together, it may be so firmly that they cannot be separated, especially in certain cases of meningoencephalitis or of hydrocephalus; or separated by wide gaping grooves, as in atrophic sclerosis. They are sometimes wider than normal, though rarely, but more frequently they are narrower and separated by shallow fissures. The general topography is rarely normal. There is generally a simplification in the convolutions and they are less sinuous than usual, pointing to an incomplete development. Certain of the convolutions may be absent altogether; others are so changed as hardly to be recognizable. Thus in true porencephaly, in which there are communications between the surface of the brain and the lateral ventricles, the convolutions which plunge into the infundibulum forming

the porus are almost unrecognizable and impossible of being called by their ordinary names.

Certain parts of the brain may be wanting altogether, and an absence of the corpus callosum has been especially mentioned. We may note an inequality of development between the corpora striata of the two sides, the cerebral peduncles, or the pyramids. I have seen the absence of one of the olivary bodies.

One thing which has always struck me is the absence of any gross lesions of the cord, such as are seen in the cord affections of previously healthy adults secondary to cerebral alterations. The cord is frequently lighter in weight than normal. The central canal is sometimes enlarged, especially in hydrocephalus accompanied by hydromyelia, sometimes narrowed or even obliterated. We may also, though rarely, meet with adhesions between the membranes and the cord. When these exist we find them especially in the bulbar region.

The ventricles do not escape. They are greatly dilated in hydrocephalus, in which sometimes they form enormous pouches, the thin walls of which burst under pressure of the contained fluid as soon as the brain is removed from the bony casing. At other times they are normal in size, but their walls have a dull appearance which has been likened to the tongue of a cat.

The cerebellum sometimes presents the same asymmetry as the cerebrum. Cases have been reported of complete absence of the cerebellar hemispheres (Bourneville).

We shall now pass in review the different anatomicopathological forms of idiocy, following the classification of Bourneville, which seems to us to be the most complete and the best.

Hydrocephalus.—Bourneville and Noir have made a very complete study of hydrocephalus, of which they distinguish three varieties, viz., simple hydrocephalus, scaphohydrocephalus, and symptomatic hydrocephalus.

Ordinary hydrocephalus is divided naturally into two classes, according as it is or is not accompanied by any malformation of the brain, as, for example, absence of the corpus callosum, of the cerebellar hemispheres, etc. In the second case the hydrocephalus occupies the lateral ventricles alone or the arachnoid cavity at the same time, and it may or may not be accompanied by an encysted hydrocephalus.

In cases of simple hydrocephalus there are certain interesting peculiarities in the anatomy of the cranium as well as of the brain. We see first that they are all more or less plagiocephalic, but they can be divided for purposes of study into two groups. In the first the cranium is rounded and brachycephalic. In all there is persistence

of the anterior fontanelle, and in some the posterior fontanelle persists as well, and the sutures are broad and membranous. The metopic or frontal suture may persist or exist only as a vestige. The coronary and sagittal sutures are almost rectilinear. More or less numerous Wormian bones are enclosed in the lambdoid suture. The bones are very thin, porous, of a membranous appearance, transparent, and striated. A band of highly vascular tissue borders the fontanelles and sutures.

The second group is very different. The skull, which is less brachycephalic, has an exaggerated occipital development. The fontanelles are not persistent, nor is the frontal suture. The other sutures are simply dentated and there are numerous Wormian bones in the lambdoid. The bones are heavy, sometimes very heavy. The internal table shows deep markings of the meningeal vessels, and transparent patches are rare. Sometimes the brain is nothing but a cyst, without vestige of convolutions; sometimes the latter are flattened, but still retain their normal topography.

The children of the first group usually die in from two to two and a half years; here the hydrocephalic fluid is very abundant and the cranium is thin and distended. Those of the second group reach a much greater age; the amount of liquid is relatively small in the ventricles and the cranium is thick.

In the first class, the weight of the child being from 5 to 7 kgm. (11 to 15½ lbs.), that of the brain is from 1,200 to 1,600 gm. (37½ to 50 oz.), 500 to 1,000 gm. of which being the weight of the fluid. In the second class, the child's weight being from 25 to 50 kgm. (55 to 110 lbs.), the brain weighs from 1,100 to 1,700 gm. (34½ to 53 oz.), of which only 100 to 150 gm. represent the fluid. Bourneville regards the second group as a natural evolution of the first, but the absence of any transition cases leads me to believe that this is not so, and that the patients in the first class could never live to the age attained by those in the second, the cerebral lesions present forbidding such a duration of life.

In the second group of the hydrocephalic we find those whose head is scaphocephalic. In these cases the hydrocephalus appears to be partial, and it is probably to the development of the occipital cornu of the lateral ventricles that the special form of the cranium is due.

The third variety, symptomatic hydrocephalus, is common and is encountered in cases of meningoencephalitis or of tumors of the brain, especially of the cerebellum. When the hydrocephalus is due to a chronic inflammation the brain is very slowly compressed, and the progressive ventricular dilatation ends by causing a disappear-

ance or a reduction to a very thin layer of the brain substance. It is remarkable that there is no degeneration of the tracts in the cord. The dilatation rarely involves the fourth ventricle, and we never find dilatation of the ependyma or hydrorrhachis. When the cause of the effusion is a tumor the fluid is more rapidly formed than in the preceding case, and then causes a separation of the sutures. In this case also we find no degeneration of the columns of the cord. I cannot insist too much upon this latter peculiarity, which we shall find also in the other pathological forms of idiocy, on this contrast between the extensive lesions of the brain and the integrity of the cord in spite of the fact that there are sometimes motor troubles, such as spasmodic paraplegia or contracture, which might lead us to suspect cord lesions. This question, which is so interesting as regards the development of the brain and of its functions, deserves greater attention on the part of histologists than it has yet received.

Microcephalus is not so common in idiocy as some writers have believed; it is even, in my own experience, less common than hydrocephalus. We cannot class among the microcephalic every idiot the size of whose head is below the average. If we took this as the only criterion, we would say that the immense majority of idiots are microcephalic. I think, however, that we should reserve this term for cases in which there are no lesions of the brain, but simply an arrest of development.

In microcephalus the bones are not separated; the sutures which unite at an early period are soon effaced, especially anteriorly, where they scarcely leave any visible traces; we never find any Wormian bones. This premature ossification of the sutures might lead us to suppose that it was that which was the cause of the defective development of the brain, but really it is because the brain is but little developed that the cranium remains small. A proof of this, which appears to me to be convincing, is that the brain in microcephalus never presents a normal topography of the convolutions; but if it was the premature ossification of the skull which impeded the normal development of the brain, there would be no reason why the convolutions should not present the normal disposition. In certain cases of microcephalus the brain presents peculiarities approaching those seen in animals, and this has led to the theory that in microcephalus there is "a partial atavistic formation in the convex portions of the brain, having as its consequence a deviated embryonal development leading back by its essential characters to the plane whence the human race has arisen" (Carl Vogt). This theory rests (1) upon the analogies between these crania and brains and those of monkeys, and (2) on the absence of morphological or pathological characters in the ascendants

of the microcephalic. Ducatte says, in support of this theory of Carl Vogt: "When I have found the subparietal fissure proper to the osmatic gyrencephalic mammifers, the deep posterior parietolimbic fold of cats, the superficial cuneolimbic folds of monkeys, I have been forced to recognize that these were evident atavistic reversions, and therefore other characters less marked have seemed to me more probably of an atavistic nature. Such are the occipital calvaria, the continuity of the parietal fissure with the external occipital fissure, and the length of the first temporal fissure. In addition to the fœtal and the atavistic characteristics, I have also found deviations of development foreign to all actual specific types (supplementary fingers, kidneys united along the median line, fibrous intersection of the rectus abdominis muscle)." But if, alongside of malformations of an atavistic character, we see others which we cannot attach to any known type, we must admit that atavism is not the only factor. It is much more satisfactory, instead of holding with the preceding writers that there are no pathological antecedents in the parents of the microcephalic, to accept fully the opinion of Bourneville, who has always found the contrary to be the case.

The skull is ordinarily thick and completely ossified. But just as we see sometimes an ossified skull in a case of hydrocephalus, so we may find in microcephalus a skull with persistent fontanelles or normal sutures. No general description can fit all cases of microcephalus. Sometimes the brain is diminished in its entirety, but its morphology appears to be normal; sometimes and most frequently the convolutions are considerably modified and absolutely irregularly. Most commonly they are simplified and diminished in number. The membranes are not usually thickened or adherent; there is, in fact, no trace of any previous pathological process.

The arrest of development of the convolutions, to which a certain form of idiocy corresponds, might be regarded as a variety of microcephalus. In this case, indeed, the cranium and the brain are sometimes very much below the normal size, but there is no characteristic deformity of the cranium and the topography of the cerebral convolutions is not modified; we find the brain of a child in the body of an adult. We may find here some traces of a preëxisting encephalitis, but frequently we can discover no anatomical lesions; there is simply an arrest of development from a certain period.

Porencephaly is a rare condition of which the pathogenesis is but little known. We understand to-day by this term all extensive losses of substance of the hemispheres. It is enough that there should be a disappearance of a certain number of convolutions, a more or less deep cavity in the hemispheres, in order that there may be poren-

cephaly. Heschl, however, who created this term, regarded as such only those losses of substance which penetrated to the lateral ventricle. I think we should return to this conception, and should not include under one term two such dissimilar lesions as an arrest of development and some necrobiotic loss of substance. In a work undertaken with Bourneville, I have recognized two sorts of porencephaly. If we would retain this term for losses of substance resulting from softening or other cause, we must designate those which result from an arrest of development by the term "true porencephaly," and those consecutive to a destructive process by that of "pseudoporencephaly."

True porencephaly is the result of an arrest of development, and is consequently a congenital condition. Pseudoporencephaly is consecutive to a destructive process, due probably to a circulatory disturbance, and occurs either during intrauterine life or later. In true porencephaly there is a communication between the depression and the lateral ventricle. In pseudoporencephaly this communication does not exist. However, this absence of communication has no absolute value, for we may readily believe that the necrobiotic process might destroy completely the cerebral substance as far as the lateral ventricle, and thus establish a wide communication with it. The arrangement of the convolutions, on the other hand, is of very great importance. In true porencephaly they are disposed in a manner radiating around the porus, into which they plunge while becoming more and more attenuated; but in pseudoporencephaly the convolutions are irregularly cut off, and those which are spared show no deviation in their direction. The shape of the porus or depression varies greatly in the two cases. In true porencephaly there is a sort of infundibulum, sometimes a simple slit, or an almost circular orifice; in pseudoporencephaly there is a vast gaping excavation, the walls of which, instead of being formed by the convolutions, consist of white substance covered by a membrane, which adheres to it closely and which forms the wall of a pseudo-cyst occupying the place of the lost substance; in true porencephaly there is no cyst, and the meninges follow the walls of the infundibulum without forming a bridge over its edges. I would add finally that true porencephaly is often bilateral, while pseudoporencephaly is always unilateral, occupying by preference the left hemisphere.

Among the other forms of arrested development which we see in idiots, we may cite the absence of the corpus callosum, of the septum lucidum, of the corpus fimbriatum, of the fornix cerebri, of the cerebellum, and of the tentorium cerebelli.

Cerebral Sclerosis.—Idiocy symptomatic of hypertrophic or tuberous cerebral sclerosis is rare. We owe the earliest description of it

to Bourneville and Brissaud. That which strikes us first is the localization of the sclerotic foci in the gray substance, either on the surface of the convolutions or on that of the corpora striata. We might therefore justly call this alteration tuberous polioencephalitis. The meninges show no special changes, and they do not seem to play any rôle whatever in the development of this affection. The lesion appears in the form of little rounded tuberosities, from the size of a pea to that of a filbert. Sometimes it occupies only one portion of a cerebral convolution, sometimes it invades several at once, but it never appears to extend to the bottom of the grooves or fissures. It is therefore rather a disease of the surface of the brain than an affection of the cortex properly speaking.

Histologically "the nervous elements are absolutely wanting throughout the entire extent of the sclerosed parts. The tissue of each of the tuberous nodules consists essentially of an excessively dense neuroglia framework. This is much thicker in the superficial than in the deeper parts of the convolutions; that is to say, the centre of activity of the process, and in all probability its point of origin, occupies the gray substance or that which was formerly the gray substance. In this sclerous tissue the nuclei are not much more abundant than normal, but a large number of them present ramifying prolongations assuming the form of spider cells. Entirely superficial, the condensation of the neuroglia proceeds to an extreme degree, and we can thus readily understand the cartilaginous hardness of these points of tuberous sclerosis. Between the diseased and the healthy portions there is no clear demarcation, but little by little the neuroglia becomes looser and we distinguish in it some cells and a certain number of very delicate axis cylinders. But those of the cells which are nearest the sclerotic centre are atrophied, yellow, and granular. This indicates that the lesion tends to increase constantly, and that however slow the process may be there is a constant tendency to invade adjacent regions, compressing and completely destroying the nervous elements which it engulfs.

"In the white substance the sclerous lesion, allowance being made for the difference in density, presents identical characters. The uniformly pink tint of the tissue is an evidence that there is not the slightest trace of myelin in the neuroglia framework, and it is only on the edges of the lesion that we may distinguish a few axis cylinders. A remarkable fact is that we do not meet with any spider cells in the portions of the diseased convolution which ought to be occupied by the white substance. We may perhaps assume by reason of this fact that the neuroglia sclerosis in the white substance is purely secondary. As to the vascularization of this morbid tissue, we find that it is

excessively restricted; we do not find in the sclerous nodules the rich capillary network of the healthy convolutions, and only vessels of some size appear to penetrate it. We do not encounter hemorrhagic lesions in any part."

Meningitis does not seem to be a cause of this lesion, which is due rather to a chronic inflammatory process of very slow development originating in the neuroglia of the cortical gray matter, but the localization of which in the most superficial portions of the brain is due to causes which we are unable to ascertain.

Idiocy symptomatic of cerebral sclerosis is rather frequent. The sclerosis may affect the brain in slightly different ways. Sometimes it is generalized throughout the whole brain; sometimes and more commonly it affects only one hemisphere; sometimes it is one lobe or even an isolated convolution which is invaded.

As a rule the meninges are not adherent and may be readily stripped off from the sclerosed portions; they are, however, rather frequently somewhat thickened. The brain is diminished in weight, and when the sclerosis is confined to a single hemisphere there is sometimes a very considerable difference in the two sides, as regards both length and weight.

Whatever is the number of convolutions involved, the appearance of the sclerotic portions is always the same. On palpation the convolutions are felt to be more resistant than the healthy ones. They are separated from each other by wider fissures than normal, which is due to the fact that they are themselves diminished in volume. In certain cases they are reduced to a thin layer of cerebral substance, almost transparent, resembling parchment, and containing no nervous element whatever. The sclerosis is distributed very irregularly in any individual convolution, and the latter consequently presents a plaited or honeycombed appearance. It is not uncommon to find the convolutions narrower than the fissures which separate them. An inequality in consistence corresponds to the inequality in volume. The vascularization of the sclerotic portions is greatly reduced, and sometimes is almost *nil*. The sclerotic tissue is formed by the neuroglia alone. The cells are diminished in number and in volume, and at certain parts have disappeared entirely.

The sclerosis may affect the entire brain, which is then seen to be made up of narrow convolutions separated by gaping fissures. More often it affects only one hemisphere. It is probable that circulatory troubles are not foreign to its development, for it is usually the right hemisphere, the one less freely supplied with blood, which is affected; besides this, it is not rare to see the artery of the base of a smaller calibre on the side of the sclerosis. Still more frequently the sclero-

sis attacks only certain parts of the brain, such as one lobe or one group of convolutions. Thus I have seen the motor convolutions on both sides affected to such an extent that they were reduced to a thin layer of indurated, transparent, parchment-like tissue. A most singular fact in this case was that it was impossible to discover, at least with the naked eye, any descending sclerosis; there was also but a very slight degree of contracture of the four extremities. This strengthens what I have said above, that the functions of the nervous centres should be studied after a new method in cases in which any lesion of the cortical centres occurs in the course of their development. We know that the medullary fibres developed before the cerebral fibres come in some way to meet the latter. Before the union is made, however, movements occur which are dependent consequently upon the cord. Why then, if this junction is not made later in consequence of a disturbance of development, should movement cease to be produced? This hypothesis, which yet remains to be confirmed by pathological anatomy, would also explain the absence of descending degeneration in the cord, the absence of union between the cord and the brain preventing such degeneration from taking place. We understand from this the want of relation to which we are accustomed in the adult between the lesions of the cerebral centres and the functional state of the regions which are placed under their dependency. But I leave these questions to the pathological anatomists.

Bourneville has described, under the name of *sclérose chagrinée*, a peculiar condition of the convolutions in which they present the appearance of shagreen on the surface, without any modification in their form or consistence. The condition, without being rare, is yet not very common. I cannot say to what anatomical condition this aspect corresponds, although in two cases I observed certain peculiarities which are worthy of attention because they possibly constitute a special form of sclerosis which, in default of a more thorough examination, I am tempted to call cortical sclerosis. In the two cases to which I allude the convolutions presented in quite a number of points little blebs resembling the blisters seen on a painted surface when it dries irregularly. A section at the level of one of these little swellings showed that they were formed solely of gray substance, which was in a measure raised and detached from the subjacent white substance, to which it was joined only by a very loose tissue. There were, therefore, no tuberosities, no outgrowths of nervous substance, but simply an elevation of the cortical layer. It has seemed to me that this is a special anatomical form, and I would recommend it to the attention of pathologists.

Meningoencephalitis is one of the most frequent causes of acquired

idiocy. Upon examination of the brain the first peculiarity observed is that there are numerous adhesions between the membranes and the gray matter, which are sometimes very extensive and which are frequently so firm that the elevation of the pia mater brings with it a more or less thick layer of the gray matter. The following are the lesions which, according to Rilliet, are encountered in these cases: The vessels are dilated and increased in number, and their sheaths are thickened or infiltrated with leucocytes and granulations. The lesions involve the neuroglia, which is thickened, containing many opaque nuclei, fibrillary, and finally vacuolated; the vacuoles appear in the form of points, afterwards of more extensive areas which may become confluent. Corresponding to these neuroglia changes there are true bands of sclerosis. The pyramidal cells present various degrees of atrophy. In the white substance we observe atrophy, a multiplication of small cells, and an abundance of granular bodies. The lesions of the cord are very diffuse and escape any attempt at systematic description. But here also we remark that with extensive lesions of the convexity of the hemispheres the cord is relatively healthy.

Cretinoid idiocy, with the pachydermic cachexia, is a special form. The chief fact of its pathological anatomy is the absence of the thyroid gland, the result probably of an arrest of development. The subcutaneous adipose tissue is the seat of numerous fatty tumors, not encapsulated, but shading off gradually into the surrounding tissues. We must note further the persistence of the umbilical orifice, whence results constantly in these subjects a more or less voluminous hernia. The cranial sutures are but partially or not at all closed; the anterior fontanelle is persistent in these cases. The bones of the cranium are incompletely ossified. The pia mater is very thin and is sometimes adherent. The brain has the gelatiniform appearance of that of the newborn. The pituitary body is hypertrophied. The cerebral topography is generally irregular and abnormal.

Unclassified Lesions.—We must add a few words concerning the other lesions which may be found post mortem in idiots. In a relatively large number of cases we do not find any lesion whatever capable of explaining death. This is especially in cases in which the idiot has succumbed to progressive cachexia, to exhaustion, or to some organic defect inconsistent with life.

We frequently find vestiges of the thymus in idiots of a somewhat advanced age, which is an evidence of an arrest of development or rather of evolution. Of all the viscera the liver is perhaps the one which is most frequently affected. Abscess of the liver, which is exceptional in our climate, is occasionally encountered in idiots; and quite frequently we find fatty degeneration of this viscus. The lungs

are very commonly the seat of tuberculosis, or more often of bronchopneumonia, and idiots frequently succumb to this latter affection. In the heart, which is usually rather below the normal size, we not infrequently note a persistence of the foramen of Botal. There are sometimes valvular changes, but these have nothing to do with the cause of the idiocy.

The spleen rather frequently presents an alteration, which I have noted before, which is sometimes met with also in the aged. This is a sort of white fibrous cicatrix, which penetrates like a wedge more or less deeply into the substance of the spleen. The stomach is quite frequently dilated as a consequence of the gluttony of the idiots. The intestines present usually no abnormality. The kidneys, on the other hand, are frequently altered, being the seat of pyelitis, pyelonephritis, hydronephrosis, or tuberculosis. The bladder is also often diseased, the cystitis being either simple or purulent. The testicles are commonly found in the inguinal canal; the ovaries are usually of very small size, and the same is true of the uterus.

It is not rare to find visceral malformations, inversion of the organs, anomalies of the deep vessels, or some form of arrested development. Any of the troubles due to a faulty intrauterine development, and which are an evidence of an arrest of development in any degree, may be encountered in these profoundly degenerated creatures, but they are not peculiar to idiots.

I have limited myself in a measure, in this description of the pathological changes in idiocy, to the post-mortem findings, to an examination *de visu* of the organs. There are many omissions in our knowledge of the pathological anatomy of this condition, omissions which unfortunately I am not in position to supply. But I have thought it of interest to dwell somewhat at length upon what we know of the lesions in idiocy, for the reason that they are of importance even beyond their relation to this mental state; they are most suggestive as regards both the physiology of the nervous centres and the doctrine of development. The study is a very complex one, for nothing is more common than anatomicopathological associations or coincidences. Following a hemorrhage or a softening of the brain, we may see either a pseudo-cyst, a pseudoporencephaly, or cerebral atrophy. Nothing is more common than to see meningoencephalitis combined with sclerosis. There are still certain forms which have been little or not at all studied, such as that which is called arrest of development of the convolutions and that which I have called by the name of cortical sclerosis. There is a vast territory here yet to be explored.

Symptoms.

The symptoms of idiocy are of two kinds, physical and psychical, to which may be added a certain number of complications which are encountered in a peculiar manner in this affection.

Physical Signs.

These are essentially constituted by the stigmata of degeneration, which are evident in the great majority of cases, and are almost never absent except when idiocy has been acquired in consequence of one of the causes above mentioned. This very considerable frequency of the stigmata of degeneration is an evidence, as I hold, that idiocy is most commonly congenital in its origin.

The general appearance of idiots is very different in the two cases. In acquired idiocy, even when it is profound, we find that the patients have often a regular cranium and face, symmetrical features, and a physiognomy which may be even pleasing and which may at first deceive us as to the intellectual condition of the person. In congenital idiocy, on the other hand, the cranial deformities, the physical stigmata of degeneration, are numerous and sometimes render the patient's appearance repulsive by reason of the asymmetry of the face and head, and the hebetudinous physiognomy, the half-open mouth showing the abnormal teeth and allowing the saliva to dribble out; the eyes are often blear, and mucus runs from the nose. The bodily deformities add to the hideous aspect of these subjects. The attitude of idiots varies. Some remain immovable, dull, insensible to all exciting causes, with fixed regard and a gloomy air, emitting sometimes a murmur or a faint inarticulate and monotonous cry; or they are the subjects of incessant tics, balancings of the body, oscillations of the head, etc., recurring in a rhythmic fashion. Others, on the contrary, are agitated, never keeping still in any one place, coming and going from right to left, running against objects, throwing themselves on the ground, striking themselves, and giving vent to hoarse and inarticulate cries. Others, again, are met with who present a very special form of emotivity; they are excessively timid, and run away on the approach of any person whom they are not in the habit of seeing regularly. The timidity and emotivity of these persons are such that their education is as difficult as is that of the subjects of acquired idiocy.

The physical stigmata of degeneration in idiots are so numerous that their description would involve a review of all physical anomalies and malformations. They are, furthermore, usually very

pronounced and can hardly be overlooked by the most superficial observer.

The head is naturally the part which presents the most remarkable peculiarities. The modifications in the size of the cranium are the first to attract attention. They are of two principal varieties, microcephalus and hydrocephalus, to which may be added a third rare form, macrocephalus. The pathological deformities are: Plagiocephaly (obliquely oval, strongly asymmetrical cranium), the most common form; scaphocephaly, acrocephaly, and trigonocephaly, relatively frequent; and finally naticephaly, due to hereditary syphilis and rare, which is a still further confirmation of our belief concerning the small rôle played by syphilis in the etiology of idiocy. We may also see, but less and less frequently in our day, certain accidental deformities due to mechanical compression of the cranium. Whatever may be the form of the cranium, that which strikes us most is its asymmetry, which is sometimes extreme.

Inspection of the face reveals many anomalies, first of which is the asymmetry which is most evident in the great majority of cases. But perhaps the most striking thing is the contrast which exists between the development of the face and that of the cranium; large, prominent, brutish in the microcephalic, the face is small, retreating, and rather delicate in the hydrocephalic. In idiots who enter into neither of these categories, the irregularity of the features is the dominant character, and it gives them sometimes a most repulsive ugliness. The frontal prominences are scarcely at all marked in the microcephalic, but are projecting in the hydrocephalic, and asymmetrical in all. Prognathism is very marked in the microcephalic, but the reverse in the hydrocephalic; it may be present in both jaws or only in one, and it gives a simian appearance to the microcephalic. The limurian apophysis of Albrecht, an atavistic anomaly, is seen in a certain number of cases. The dental system offers very numerous and constant anomalies. We must distinguish between the anomalies affecting the teeth themselves and those affecting the maxillary articulations.

The anomalies in the shape of the teeth are varied and sometimes of such extreme degree that the teeth are scarcely recognizable. Differences in size between two homologous teeth or between several teeth of the same series are also frequent; the teeth are either excessively developed or very small. Their number is rarely normal; the absence of certain teeth is not rare, and the canines are almost the only ones which are never wanting. On the other hand, there are sometimes, though rarely, supplementary or rather supernumerary teeth. Anomalies of seat are almost constant, the implantation being

ordinarily faulty; the direction may also be bad, taking the form of anteversion, retroversion, or rotation. There may be an abnormal union of two teeth simulating a compound tooth of the herbivora, or divisions result from a separation of the roots, such as we see in the lemuridæ; or again there is a simple widening of the interdental spaces, by reason of the large size of the jaws, or a crowding together of the teeth in consequence of the narrowing of the maxillary arches. The opposing crowns may not fit when the jaws are closed, or the two rows may not overlap normally, wide spaces being left between them. Finally, we may mention abnormalities of structure, the most important being erosion in all its varieties, constituting a developmental trouble.

The true anomalies of the maxillary articulation are the most important, for they betray a defect of development and contribute singularly to give to the idiot a peculiar physiognomy; they affect the general disposition of the dental arcades and their respective relations in different planes, embracing all forms of prognathism, opisthognathism, etc. Among these anomalies there is one which appears to be peculiar to idiots, and which consists in the fact that the mouth cannot be completely closed, the last molar teeth being the only ones which touch, the others being separated by wider and wider intervals as they are nearer to the median line.

The eruption of the teeth in idiots is usually abnormal. It is exceptional to observe precocity in this respect, a retardation being much more common. The first dentition persists longer than normal, and there may thus sometimes appear to be supernumerary teeth, or a third dentition may be supposed to be present.

A study of the jaws and of dentition leads us naturally to that of other anomalies in the mouth. Idiots frequently have the mouth open, the saliva drooling away. Harelip is not uncommon, but exstrophy of the upper and ectropion of the lower lip are the malformations which are most frequently encountered and which contribute in large measure to give the idiot his peculiar expression. The palatine vault is quite often narrow and high, and sometimes has the shape of a deep cleft. The velum palati presents no anomalies peculiar to idiots. The tongue is often deviated and asymmetrical, and is very commonly greatly enlarged. Frequently also we see on it cicatrices of wounds caused by bites, especially if epilepsy exists as a complication.

The ears are almost always deformed, the lobule being the part the conformation of which is usually modified. It is sometimes too long, but more often is small or even absent; it is sometimes adherent, and is inserted into the cheek at an acute angle, or it may look as if

webbed. There may also be numerous anomalies in direction or in the folds of the lobule, but the most common and important deformity is adhesion to the cheek. The pavilion also presents a very irregular development, and ordinarily stands out straight from the head. In addition to the fact that the two ears are frequently asymmetrical, the various parts which enter into the formation of the pinna may present morphological irregularities of various kinds, but which, since they are not peculiar to idiots, need not detain us. We will mention only the possible existence of Darwin's tubercle, which is a projection from the posterosuperior border of the helix. The antihelix is sometimes united at the root of the helix, or may be greatly increased in size.

Deformities of the nose are very common. According to Révillet, a deviation to the left to the point of deformity is to be observed in more than half of the cases. Congenital deviations of the septum and consequent narrowing or even obliteration of the nostrils are frequently seen. There is, however, no abnormal form special to idiocy. The nasal fossæ are frequently the seat of a chronic catarrh. Hypertrophy of the mucous membrane covering the septum and turbinated bodies is seen with a frequency which is all the more remarkable as such affections are relatively uncommon in those of sound mind.

There are many peculiarities of the eyes. The eyebrows are usually but little prominent. The lids are often the seat of congenital or acquired deformities, such as coloboma, adhesions to the globe of the eye, trichiasis, entropion, ptosis, or epicanthus. The conjunctiva is quite commonly congested. The eyeball is often unusually prominent. Congenital anophthalmos has been noted. The cornea may be too small (microphthalmos) or too large (hydrophthalmos); it is frequently altered in its form, presenting anomalies of curvature (astigmatism). Deformities of the iris are not uncommon. Such are total or partial absence of the iris, coloboma, abnormal situation, irregularity in shape, or imperforation of the pupil, or the presence of several openings. Anomalies in color and asymmetry of the iris (iridian stigmata of Féré) are certainly very frequently seen in idiots. Strabismus occurs in a large number of cases; it is almost always convergent and is combined with defects of refraction, and also related to hypermetropia, which is frequent in idiots as in animals. We also sometimes see muscular insufficiency and nystagmus. Idiots are often blear-eyed, and there is blepharitis, resulting in many cases in a falling of the lashes, as a result of which there is a constant winking rather peculiar to idiots.

Continuing our somatic observations, we see that idiots are very frequently undersized, appearing often not to be more than ten or

twelve years old when they are in reality twenty or twenty-five—those, that is to say, who reach such an age.

The thorax is deformed; the spinal column often presents abnormal curvatures; the sternum is too projecting or depressed; there is not uncommonly an asymmetry between the two sides of the chest.

The upper extremities are generally too large for the body; this may give the idiot a certain resemblance to a monkey, which is accentuated by the stooping posture taken by these patients in standing or sitting. The lower extremities may be imperfectly developed, and there are many idiots who cannot walk at all. There may be actual teratological deformities, such as ectomelia, hemimelia, or plicomelia. More often the extremities themselves are deformed, and we may find polydactylia, syndactylia, and especially congenital clubfoot, ankyloses, diastases, deviations, and congenital dislocations. Asymmetry of the limbs is also very common. The most common deformities of the extremities, however, are those due to pathological complications, and are the consequences of the cerebral and spinal lesions which are at the root of the idiocy itself. Such are hemiplegia with contracture, quadriplegia, paraplegia, Little's disease, infantile cerebral paralysis, local or general muscular atrophies, and double athetosis, which constitutes a special affection, a peculiar form of idiocy. Friedreich's ataxia and syringomyelia have also been noted in idiots. We must expect, furthermore, to meet in these creatures with all kinds of symptoms resulting from changes in the central nervous system.

Rachitis is not uncommon in idiots, and contributes still further to the deformation of the extremities.

There remain to be noticed certain anomalies which may be called functional, such as a want of relation between the fingers, especially affecting the thumb which has little power of opposition, increased size and flatness of the foot, projection of the heel, an exaggerated deviation of the great toe away from the central line of the foot, and its relative prehensibility; all these are characters which are regarded as atavistic, and which have led some authors to consider idiots presenting them, the microcephalic especially, as showing a sort of regression towards the primitive type of man. We shall see, however, that there is nothing in this supposition.

The abdomen and the pelvis show vices of conformation, especially narrowness, which is most marked in girls, in whom also the mammary glands are but slightly developed. Congenital or acquired hernias, umbilical, inguinal, or rarely femoral, are quite common. There is a form of idiocy, the myxœdematous, in which umbilical hernia is constant. Examination of the genital organs reveals the presence of

exceedingly numerous malformations, the importance of which is considerable, since they usually produce impotence and sterility. In boys we commonly see cryptorchis, either single or double, the testicles being frequently retained at the ring or in the inguinal canal; when they are in the scrotum they are often of unequal volume and smaller than they should be in children of the same age. Hermaphroditism is rare, but hypospadias is frequently seen. The penis is ordinarily small, but sometimes presents an excessive development; it may be twisted on itself, and often, especially in masturbators, presents a peculiar form of the glans, which has given it the name of club penis. Malformations of the prepuce, such as phimosis or undue shortness, are frequent. Finally, puberty is much retarded, and may indeed never appear.

In girls, in whom Jules Voisin has studied the genital anomalies as Bourneville and myself have in boys, the labia majora are often normal; in some, however, especially in onanists, they are small and but slightly prominent. The prepuce of the clitoris is usually large and elongated, and besides the prepuce the labia minora are also most frequently hypertrophied. There are sometimes intermediary folds between the labia majora and minora. The borders of the latter may be ragged and pigmented.* The meatus urinarius is usually normal, but may be gaping and dilated. The hymen appears often under the form of two little lips with hypertrophied borders; it may be ragged and proliferating; sometimes there are bands uniting it to either the right or the left labium minus. I agree with Jules Voisin in the belief that these modifications, like certain analogous ones in boys, are connected with the almost universal habit of masturbation among idiots. Contrary to what is observed in boys, puberty in girls does not seem to be retarded. The mammary glands develop at about the normal period, but there are certain peculiarities connected with them. Sometimes the areola is not pigmented, but more often it is of very large size and sometimes oval in shape. The nipple is sometimes absent, sometimes very prominent. In most cases the breasts are flaccid and pendent, sometimes almost as if pedunculated.

The skin and the hairy system offer certain anomalies which are worthy of mention. An adipose thickening of the skin has frequently been noticed, polysarcia is not rare, and myxœdema due to absence of the thyroid gland in cretinoid idiots is characteristic of this form. The skin is rugous in idiots of this class; it is often thickened in others, and its purplish coloration, especially over the extremities, is an evidence of faulty circulation and a bad state of the vasomotors. The hair of the scalp is usually coarse and badly implanted. The beard is almost always absent or very imperfectly

developed. The eyebrows and lashes are usually scanty, and the same is the case with the hair in the axillæ and about the genital organs. The skin is sometimes absolutely hairless. At other times there may be an exaggerated and precocious development of hair. In some cases the presence of hairs along the spinal column and on certain parts of the limbs has been noted, and over the sacrum is sometimes a little tuft of hair, a vestige of a rudimentary tail.

The nails are usually thickened, dry, and falling; they are generally reddened and quite frequently macerated, in consequence of the habit which idiots have of putting their fingers into the mouth.

Finally, we may observe on the surface of the body scars received from falls, especially when epilepsy is associated, from voluntary mutilations, or from the continued traumatisms which many idiots with tics inflict upon themselves, such as bites, or the indurated bosses caused by striking themselves constantly on the same part of the body, usually the forehead.

Such are the modifications—either congenital, pathological, or acquired—which are encountered most commonly in idiots in the physical sphere. But we must also examine into the condition of their viscera and their organic functions.

Digestive troubles are not rare, and result from the gluttony common to most of these patients, who scarcely ever masticate their food. Acute indigestion is very common, and so is diarrhœa. The respiratory movements are often weak, and pulmonary complications are the most common cause of death. There results from this also frequently a poor general circulation. The heart is not uncommonly the seat of congenital malformations, as we have seen in the section on pathological anatomy. All this contributes to alter profoundly the general nutrition, which in bad cases of idiocy is always very poor and seldom allows of a long lease of life, death occurring perhaps much more frequently from progressive cachexia than from any intercurrent affection or complication.

We are far from observing the same troubles in imbeciles. They may indeed present stigmata of degeneration, but not always and even then often but slightly marked. They never present the special appearance of idiots, neither in attitude nor in physiognomy nor in the somatic complications resulting from nervous lesions; indeed, to see them act and hear them speak, they may at first give the impression of being much more intelligent than they really are. Their physical development is sometimes above the normal, their degeneration affecting almost exclusively the mental side. Physically, therefore, they are entirely distinct from idiots, and ordinarily they have no organic nervous taint which would enable us to refer their intellectual

weakness to any lesion of the nervous centre. It is dependent solely upon a natural, non-pathological, constitutional state, not acquired either during intrauterine life or after birth. It is, in a word, to a physiological state that imbecility is due, while idiocy is always the consequence of a cerebral pathological change.

Mental Condition.

On what primordial characters ought we to base our appreciation of the mental condition of idiots? Is it to be on the speech, the will, attention, or sensation and the perception of sensations? It is evident that speech cannot be taken as the criterion of the degree of intelligence, for a very localized lesion is sufficient to prevent the development of the power of speech. The will, which Séguin regarded as so to say the only thing altered in idiocy, could not now be taken as a measure of this state, for we should have to admit that the mental powers of the idiot are normal and that it is aboulia alone which prevents him from exercising them. If Séguin had known of cerebral localization or even of the cerebral lesions present in idiocy, he would doubtless not have advanced such a theory. As to sensation and the perceptions, it is evident that we have here the keystone of intellectual development, but by no means the criterion of idiocy, as has been held by Jules Voisin. It is indeed far from being sufficient for intellectual development that a sensation may be perceived and effectively perceived; it is further necessary that this sensation be compared with similar sensations previously perceived, and that it be associated with a certain number of other sensations; that is to say, it is necessary for memory to come into play, and for that there must previously have been attention, either spontaneous or voluntary. If the perception of sensations is the *conditio sine qua non* of knowledge, attention is no less a *conditio sine qua non* of education and of intellectual progress. It is for this reason that I have proposed that the attention be taken as the basis for a practical classification of idiocy and imbecility. Even though it gives us no information concerning the intellectual condition of an idiot, it does give us very important information in regard to prognosis and the possibility of the later development of the intellect.

The faculty of attention is primarily in relation with the vividness of the sensations. Now in idiots the sensations are very dull, whence it results that their attention is attracted with great difficulty or not at all in early life, and this is a fact which always forcibly strikes the parents of idiot infants. From birth, then, this defect of attention prevents the child from perceiving sensation distinctly, and later these sensations remain isolated and awaken no idea of relation one to the

other, consequently excite no ideas and no knowledge. The state of idiocy must therefore inevitably go on increasing more and more. I maintain that, from a practical point of view, attention is the character by which we are best able to judge of the possibility of the intellectual development of idiotic children, and also of the actual condition of the intellect at any given moment.

Perception of Sensations.—Sensation being the basis of all knowledge, we must first examine into the way in which the perception of sensation is accomplished. The first difficulty arises when we interrogate the parents as to the age at which the idiocy began, for it is often difficult and sometimes impossible for them to give any answer. This is a very simple matter to determine when the idiocy is consecutive to an acute cerebral affection, which has also been followed by a hemiplegia, epilepsy, strabismus, or the like; but is very difficult when the idiocy has come on gradually, accompanied by no pronounced malady, except possibly convulsions, which are so frequent in infancy but which constitute a symptom so ill defined that it is of little assistance in any case in clearing up the etiological diagnosis. In the case of idiocy, however, it is of interest to know when the affection began, in order to determine with a certain degree of probability to what anatomical form it belongs, and consequently to know what the prognosis may be. Fortunately there are certain signs by means of which we are able to recognize idiocy as soon as it appears in a young child. These signs we will now pass briefly in review.

The parents feel better than they can describe an indefinite something in their child which disturbs and worries them, and forces them to the confession that "he isn't like other children." It is only by comparison and by observing the *ensemble* that we can seize the delicate shades which distinguish children of a very young age one from the other. There are a certain number of manifestations which all children present from the earliest moment, and by which one may judge them. Such are the cry, movements, the regard, and the action of nursing, and it is the modifications in these various respects that idiots present which most strike the attention of the observer.

Many congenital idiots have difficulty in nursing, although this is a purely reflex and instinctive act; it seems to be a new thing to them each time that the breast is presented to them. In other cases from the moment of birth the children have a cry which is either constant or is frequently repeated in attacks of long duration. In a certain number of idiots there is congenital blindness, which is a sign of profound degeneration. At the time when the child ought to begin to take notice, the parents remark that he cannot fix his regard and that "he has a queer way of looking." The child's eyes do not fol-

low objects, which seem nevertheless to have momentarily attracted his attention. In other cases the eyes do not rest on anything at all, and the children appear to see nothing. What is noted in regard to the sight is soon discovered in regard to hearing also, and the parents believe that the child is a deaf-mute.

The laugh is quite characteristic in its absence; whatever ordinarily excites laughter in young infants produces on idiots no effect. Laughter, which is peculiar to man, is wanting entirely in idiots. Finally, even the movements, limited as they are in the earlier periods of existence, are nevertheless a means of distinguishing idiots from normal children. Sometimes there is an inertia from which nothing can arouse the infant; sometimes it is an incessant movement. The first is more common in early infancy, the second after the child has learned to walk.

The Special Senses.—Vision is the only one of the senses in which we can, in the case of idiocy, distinguish between changes in the sensorial apparatus and those of perception itself. In the case of the other senses—hearing, taste, smell, and touch—we are forced to rely upon information furnished by the patient. Indeed, we must not forget, when dealing with idiots, that the want of attention may cause them to pass as blind, deaf, or anæsthetic. In respect to sight, it is easy to determine whether the apparent blindness is due to a lesion of the visual apparatus or to a want of attention. In the majority of cases we have to do with troubles of central origin, the eye itself being sound, and the pupillary changes showing that there are no gross lesions present. The iris is rather commonly abnormal; sometimes it is variously colored, sometimes it is malformed; inequality of the pupils is frequent. There may be a congenital cataract, or lesions of the vitreous, or floating bodies. Pigmentary retinitis is sometimes observed. We may meet with exstrophy of the choroid or papillary œdema having a relation to central lesions.

In my experience blindness, either congenital or acquired during infancy, is encountered in only seven or eight per cent. of the cases of idiocy. It is altogether exceptional in imbecility; indeed, the visual disturbances associated with this condition are not more numerous than they are in normal individuals. The determination of the degree of visual acuity is extremely difficult, if not absolutely impossible, in most idiots. In the great majority of them, according to Schleich, hypermetropia exists.

The perception of colors appears to bear a special relation with intellectual development. Jules Voisin gives the following statistics of this sense in idiots: 97 per cent. recognized red and black; 73 per cent., blue; 55 per cent., green; 34 per cent., yellow; 16 per cent.,

violet. I have never seen true achromatopsia or dyschromatopsia which could be referred to anything else than insufficient education or a defect of attention. Strabismus is frequent, and we have seen that it constitutes a very important stigma of degeneration; it points very commonly to the occurrence of convulsions in infancy. Notions of form and of size, of extent, of distance, and of relief are extremely difficult to teach to idiots, and most of them never acquire these perceptions; they necessitate complex movements and ideas of comparison which are entirely wanting in idiocy.

Hearing is, after sight, the sense which we might call the most intellectual, if indeed it does not take rank of sight in this respect. Its importance in education is considerable. Just as a certain number of idiots are blind, so a certain number are deaf, but it is often very difficult to know whether the deafness is due to a cerebral lesion or to one of the auditory apparatus, or whether it is not simply due to a want of attention. Deafness, according to my researches, is much more rare than blindness. Wilbur found only seven deaf-mutes and nine partially deaf children among two hundred and eighty idiots. Séguin even thinks that the proportion of congenitally deaf is less among idiots than among normal children. Alongside of deaf-mutism there is a pseudo-deafness which is the result of a want of attention, but it is sometimes only at the end of a very long period of observation that we are able to differentiate it. If, however, by the age of five years the child shows no appreciation of any noise, while at the same time he appears to be capable of attention in what concerns the other senses, we may conclude that we have to do with a true deaf-mute. In imbeciles hearing, like vision, does not appear to us to present anything abnormal.

Taste and smell are the two senses most frequently affected, but as their importance in intellectual development is very slight, their defects are without much interest. In profound idiocy it is absolutely impossible to observe any manifestation of pleasure or disgust for any article of diet or any odor. In simple idiocy in its various degrees we encounter almost universally voracity or gluttony; nothing can equal this—and one must have been present while idiots were eating to get any idea of it. As a result of it, idiots not infrequently die from foreign bodies in the air passages. In the lowest degrees of idiocy the patient seizes the food with both hands, smears it over his face, thrusts it greedily into the mouth, and swallows it without taking time or trouble to masticate it. In less profound degrees idiots have no choice as to food, but eat everything with the same voracity, always preferring quantity to quality. At the sight of food they rouse themselves somewhat from their apathy and rush forwards,

showing by all sorts of gestures their physical desires, just as do animals. In imbeciles there is greediness rather than extreme gluttony, and very many of them have a constitutional, often hereditary, taste for alcohol.

There are many anomalies of taste. Many idiots of lower degrees are incapable of distinguishing sweet from bitter. Sometimes there is an inversion of taste, bitters being preferred to sweets. There are also perversions of taste. I do not speak here of extreme idiots, but of those who are capable of working, or even of imbeciles, who eat ordure and most disgusting things, such as caterpillars, raw mice, spiders, or excrement.

The same remarks apply to the sense of smell, which, however, appears to be even more obtunded than that of taste. We may even affirm that the central organ of smell is often affected, for irritating odors do not cause any local or reflex phenomena, such as are manifested so quickly in normal individuals. But in the case of idiots we must guard against certain causes of error in our examination, such, for example, as may result from the irregularity and shallowness of their respirations. The two senses of taste and of smell are also usually correlative, but alongside of cases of obtuseness we may observe those of extraordinary acuteness. This combination of exquisite sensibility for certain things and of insensibility for others is possibly due to the fact that the patient's attention and interest are differently involved.

Tactile sensibility is usually very obtuse, but always uniformly so and not in patches. In profound idiocy we may sometimes question whether there is not complete anæsthesia. We sometimes see idiots scratch themselves, tear off pieces of skin, gnaw at their fingers, and mutilate themselves in a thousand ways without appearing to experience any painful sensation. Simple contact, tickling, and pricking are not felt, and they sometimes look at us with an indifferent air while we are testing them. Alongside of these are others who, although manifesting no signs of pain, nevertheless evidently feel some dull sensation, possibly an agreeable one, which leads them to repeat the same movement incessantly. Belhomme has remarked concerning this that they have a necessity of feeling again former sensations even when they are painful ones.

In spite of very profound troubles of sensibility we may, however, be able to develop the sense of touch, like the others, in a certain measure. According to Séguin, indeed, it is this that we should first exercise, for it is by means of it that the child enters into voluntary communication with his surroundings without the need of hearing or sight. In certain idiots the sense of touch is developed to a great

degree by way of compensation for an absent sense, especially sight, and by means of it alone they are able to recognize persons about them. This is a further argument in support of the belief that the anæsthesia, partial or complete, which they seem to present depends especially upon a want of attention. I have never observed a dissociation of sensibility.

In imbeciles we may meet with troubles of sensibility, but they are all due to a nervous complication, hysteria especially, and have no connection at all with the original intellectual defect.

The temperature sense runs parallel with those of touch and pain. As Morel has remarked, the functions of the skin are badly executed, and the temperature of idiots is below that normally seen. Their great susceptibility to cold is without doubt the cause of the relatively large number of deaths from pulmonary affections which we find in idiots. The effect of the outside temperature upon certain idiots is worthy of remark. Some of them might, indeed, be called hibernating, for during the winter they fall into a sort of lethargy, a physical and intellectual torpor analogous to that of the marmot. On the other hand, an elevation of the central temperature sometimes quickens their feeble intelligence, as we may observe temporarily during an intercurrent fever. This would seem to show that there exists a latent intellectual power which may be put in evidence by an appropriate stimulant in certain cases.

Motility.—The study of the muscular sense in idiots is very difficult because of their defective comprehension. In profound idiocy it appears to be as obtuse as any of the other senses; the creatures rest inertly on a chair or in the bed without making the slightest movement; but these constitute the smallest number. The majority, on the contrary, are continually in motion; but their movements are peculiar in that they are in some sort rhythmical, cadenced, and automatic, that is to say they are tics. We must distinguish them from the spasmodic movements which may also be observed in idiots as a result of cerebral lesions. The tics are extremely varied and it is impossible to give a complete description of them. The principal ones consist in a balancing of the trunk anteroposteriorly or laterally, or in a simultaneous balancing of the trunk and head accompanied frequently by monotonous humming, an intermittent cry, or a word previously learned and the last vestige of language which they possess. We cannot affirm that these automatic movements cause them pleasure as does the muscular activity of normal infants, yet some cry when they are prevented from executing these movements. This may be an evidence that they derive a sort of unconscious satisfaction from the movements, but nothing of the conscious pleasure felt

by infants in their actions. For the child in making a movement has an end in view, however little adapted to its attainment this movement may be, and his satisfaction is in proportion to the success which he has in attaining this object. But in the idiot not only the tics, but also many other movements, are performed absolutely without any end in view. The difficulty which most of them have in associating the movements for a determinate end is very characteristic and bears no relation whatever to the degree of intellectual development; we may see, for example, idiots who know how to speak, to read, and sometimes even to write, who are yet incapable of dressing themselves. This difficulty in dressing is seen quite frequently also in imbeciles, even adults; clothing one's self is a true gymnastic exercise, requiring much precision, and it is by it that we should begin the education of coördinate and combined movements.

Before passing to the study of voluntary movements we may say a word as to right- and left-handedness. Ireland has found that the proportion of left-handed children among idiots is the same as among normal children, namely, twelve per cent.; but while there are eighty-eight per cent. strictly right-handed in normal children, there are only seventy-two per cent. in idiots, sixteen per cent. therefore being ambidextrous. This is a peculiarity which has been noted also among criminals, and which shows the analogies that exist between criminality and degeneration.

Motility has numerous relations with intellectual development. As a general rule all children who are intellectually backward are also behind in their physical development and especially in three things, viz., dentition, walking, and the action of their sphincters. Among all the observations of idiots, we notice a more or less marked backwardness in walking which is learned only after eighteen months or two or three years, or even later, and sometimes never. This may be due to an actual muscular weakness in the lower extremities or to true paralysis, but most frequently it is the result of an inaptitude of the children to learn the special movements required in walking, which, as we know, before becoming automatic are voluntary. Alongside of walking, which is always retarded, we note also that children accomplish tardily, or never, acts which are most necessary for the maintenance of life, such as carrying food to the mouth with the hands or, in more marked degree, with a spoon or fork. There is in them a sort of motor incoördination which is normal in all children up to a certain age, and which later gives place to voluntary motor coördination; in idiots the latter appears only very tardily, the will and attention being but slightly developed. Furthermore, the memory being very weak, that of associated and coördinated movements is

also imperfect. Even instinctive movements, such as those of expression, appear tardily, and are in general very limited. We shall return to this when we come to speak of the expression of the emotions and sentiments.

Organic Sensations.—We have yet to examine another order of sensations, namely, the organic. In the normal individual these are felt under two conditions, that of necessity and that of disease. Among the organic sensations hunger and thirst are the two most indispensable to man, for without them existence becomes impossible. In idiots these fundamental sensations may be weak, and it is this which explains the fasts of certain idiots, two examples of which have been reported by Bourneville. But these are exceptional cases, and the rule is that idiots, even most profound ones, suffer from hunger and thirst, which they express by cries, by disorderly movements, and by gluttonous satisfaction when food is placed before them. But they have little sensation of satiety, and their voracity is such that they will keep on swallowing indefinitely, almost to the point of suffocation if they are not prevented.

The sensation of the need to evacuate the bowels or bladder appears to be completely abolished in profound idiots, who soil themselves invariably and in whom nothing either in attitude or expression betrays any sensation experienced at the moment of satisfying this desire.

We must always expect, therefore, to find that the organic sensations in disease are blunted. The physician of idiots is in a worse situation than the veterinary surgeon, for the idiot gives no sign by which we can locate his disease or his pain, and we have to rely only upon the most obvious objective signs, the temperature and the condition of the digestive tract, in forming a diagnosis. Interrogate these patients and they do not reply, palpate them and they betray no signs of pain, auscultate them and they do not know how to breathe. It is on this account that they often die before we have discovered that they were ill.

These disturbances of organic sensations are encountered in a less degree in educable idiots. In imbeciles, however, we often meet with another kind of difficulty. Being great liars and very imaginative, they often mistake for pathological sensations their normal ones, which they exaggerate in order to make themselves interesting. They pretend to give indications, but almost always do so incorrectly, and we can make them say whatever we wish.

In a word, the very obtuse sensibility in idiots shades off gradually into the normal in imbeciles. The senses of taste, of smell, and of touch, which demand the greatest delicacy of perception, are the

ones which are the most affected. The sensations due to functions which are most indispensable to existence are themselves in certain cases as blunted as the others. The differences which exist in this respect between profound and incurable idiots, and educable idiots or imbeciles, may up to a certain point serve as a basis for the classification of these unfortunates.

The condition of sensibility and that of motility being intimately united to that of the intelligence, it is readily seen that in order to develop the latter we must begin by developing the sensations and movements.

Attention.—There are two very distinct forms of attention, one spontaneous and natural and the other voluntary and acquired. The first is the true primary fundamental form, the second is the result of the first. It is with the first that we must occupy ourselves chiefly, since without it the second could not exist.

It is easy to foresee from the beginning the weakness of attention in idiots by simple pathological considerations. Ferrier has shown the relation apparently existing between the development of the frontal lobes and attention, and also the results of ablation of these lobes. On the other hand, the faculty of attention has been shown primarily to be in relation with the acuteness of the sensations. But we know that the frontal lobes are, like the rest of the brain, frequently affected with more or less profound organic troubles and that their sensibility is more or less obtuse in idiots. The two conditions of a weakening of attention are therefore united in them.

From a psychological point of view, according to Maudsley and Ribot, we may regard attention as the result of an affective state, putting into play the motor power. Now, in idiots, as we shall see later, the affective state is wanting entirely or partially. As to the second factor, the motor element, we know also that it very frequently presents anomalies, such as paralyses, contractures, convulsions, automatism, etc., or less marked troubles, such as incoördination, athetosis, or awkwardness. Among the affective states those are the most simple which first determine attention, and these are the ones which have as their cause the tendencies, appetites, and needs, and which are connected in the last analysis with that which is most profoundly rooted in the individual, the instinct of preservation. But we have seen that all these affective states, even the instinct of preservation, are more or less diminished in the idiot. The most simple elements of attention are therefore wanting, and everything concurs to weaken the power of spontaneous attention, which may even be completely abolished. What more can we say concerning attention applied to what takes place in the individual himself, that is to say, reflection?

That is an intellectual phenomenon totally foreign to most idiots and even to a large number of imbeciles.

Education is based almost exclusively upon the action of voluntary attention, and Ribot distinguishes three periods in the formation of this attention: 1. The educator can make use of only the most elementary sentiments, such as cruelty, egotism, the hope of reward, tender and sympathetic emotions, curiosity, etc. 2. Attention is aroused and maintained by sentiments of secondary formation, such as self-love, emulation, ambition, duty, etc. 3. Period of organization—the attention is aroused and maintained by habit.

We will now consider briefly these three degrees in idiots. In profound idiocy the attention may be said not to exist at all, the sight of food alone having sometimes the power to draw the subject from his indifference. Of ideas or sentiments there are none, and of sensations there are scarcely any. The only need which these idiots feel vaguely is hunger, and this sensation and that which results from the meeting of this want constitute all their intelligence. If we analyze the singular impression which congenital idiots give from the earliest period of their existence, at a time when the intelligence of normal children is no more developed than theirs, we shall see that it is really due to this want of attention which cannot be awakened in any way. In simple idiots we may find a spontaneous attention which is capable of being developed and even of being transformed into voluntary attention. In other words, simple idiots are educable in a certain measure, while profound idiots are not, and this difference is due to the presence or absence of attention. This remark is equally applicable to animals which it is sought to train.

In the case of simple idiots it is often very difficult to awaken the attention of which they are capable. An attention which demands no effort on their part or which awakens in them a feeling of pleasure is the only one which can be discovered in the lower degrees; it is only in idiots of higher degree that we are able to determine voluntary attention and by that to develop their general intelligence. Upon the basis of voluntary attention we may establish different degrees in the class of simple idiots. In some it occurs very rarely or intermittently, as for example under the influence of some great satisfaction; in others it may be aroused more easily, but is evanescent and not sustained; in others again it becomes almost habitual whenever they are placed in the same conditions under which it was awakened before. These three varieties, of which the first two are much the more common, are readily distinguished by two principal manifestations, namely, work or idleness, and discipline or undiscipline.

According to Ribot, attention is born under the pressure of neces-

sity and with the advance of intelligence. It is easy to show that before the age of civilization voluntary attention did not exist or appeared only in flashes of short duration. It is the same with idiots, and just as we may note in the history of human progress the succession of the reign of voluntary attention upon that of spontaneous attention, so we may observe these two stages in simple idiots, those of the last degree being too imperfect to enter into comparison with normal man.

The most concrete expression, the one seizing most firmly upon voluntary attention, is work. Among civilized nations there are undisciplined individuals who are incapable of work, such as tramps, prostitutes, and the like; and we may add to these idiots and most imbeciles. Undiscipline, laziness, and weakness of attention, parallel to that of the intellect, go hand-in-hand, as we see exemplified most clearly in the case of idiots. The weaker these are mentally the less attentive they are and the more lazy, undisciplined, and uneducable. The affective sentiments capable of putting into action their voluntary attention are so feeble that they are uninfluenced by repression, or punishment to which these idiots are indifferent, since experience does not exist for them, all phenomena remaining isolated, never being associated nor determining abstract ideas. Others, on the other hand, are very amenable to discipline and may even learn a trade. If we compare the first to savages we may say that the second are beginning to be civilized. But this is no argument in support of the theory that criminality is only atavism. There is this enormous difference between primitive peoples and the unfortunates whom we are now studying, that in the first the appearance of voluntary attention and of work indicates the progressive development of their intelligence, while in the second the same state of the attention is but a residue and indicates their intellectual and moral degeneration.

Ribot's opinion that voluntary attention is a sociological phenomenon, that it is an adaptation to the conditions of a higher social life, that it is a discipline and a habit, appears to me to be absolutely correct. But from a social point of view, when the voluntary attention is as rudimentary as it is in idiots, and is combined with a very considerable intellectual deficiency, there result no very evil consequences. Idiots are not very dangerous, especially as their mental condition is most frequently such that they are of necessity placed in an asylum for life. In imbeciles, on the contrary, voluntary attention exists within certain limits, but it is impossible to fix it; the relative intelligence which accompanies it and which is warped in its development, as we shall see later, makes these individuals often dangerous, and all the more since, contrary to what is the case in

idiocy, their mental state permits them usually to be left at liberty. In view of these considerations I have proposed to define idiots as extra-social and imbeciles as anti-social.

What is the condition of attention in the imbecile? It exists in him, but if there were only a difference of degree (always difficult to appreciate) between it and the attention of idiots on the one hand and of normal people on the other, I should not have taken this as the basis of a classification. But there is another character to be considered than its degree, and that is its instability. The imbecile has an attention which is especially intermittent. It passes from one subject to another with the greatest facility without there being any relation whatever between the two. Imbeciles talk with the greatest volubility, make up cock-and-bull stories without end, and do not wait until a question is completed before they reply to it, an evidence that their attention is attracted only by the first word and that they are incapable of sustaining it in order to understand to the end what is being said to them. They interrupt incessantly. Even their curiosity is unable to restrain them; they assail one with questions, but cannot wait for the first to be answered before putting a second.

This instability of attention for external things or for ideas is equally pronounced as regards acts. Thus imbeciles are incapable of good work, perhaps even less so than idiots up to a certain degree. In the latter, indeed, we are sometimes able to determine a sort of automatism which enables them to accomplish mechanically a certain task, and always the same one. An idiot sees the act immediately to be performed, but does not see the object and consequently the relations between the successive acts done by him. The imbecile is capable of understanding the object to be attained and does not doubt his ability to attain it at once. His lively attention in the beginning enables him to execute properly the first series of acts necessary for the given purpose; then it begins to grow weak and passes to other objects. Therefore if idiots are not constantly watched and directed they spoil whatever they are engaged at. They pretend, however, to be able to undertake anything and often do so. There are others who are incapable of even beginning any work whatever, in spite of all incentive thereto, and they will spend whole days doing nothing, coming and going hither and thither, like flies, believing all the time that they are doing something of the utmost importance.

On the basis of attention we may also divide imbeciles into two groups, namely, those whose attention is dissipated by outside distractions and those in whom the attention is weak through absorption; the latter are much less numerous than the former.

We said above that we could place in the class of those who are

refractory to work, the anti-social, the imbeciles alongside with the tramps, the prostitutes, and the habitual criminals. These individuals, indeed, are incapable of fixing their attention on anything whatever for any length of time, are without attachment for their families, without preoccupation for the morrow, and often have a very pronounced impulsion to vagabondage. They go off without knowing where they are going, marching straight ahead, and taking advantage of any open door to abandon their families, without taking any thought concerning their means of existence. We often find them escaping from asylums, a much more explicable occurrence than when they are living with their own family. These flights are the result probably of their natural instability. The want of discipline in them is a true characteristic symptom of their condition, which fits in very well with their impulse to vagabondage. It would seem as though they were capable of attention only for evil.

Related to attention are two other special psychic phenomena, to wit: reflection, which is attention applied to interior phenomena; and preoccupation, which is an absorbing, besetting attention which projects itself always from the past into the future and which has causes of the most varied sort.

In simple idiots reflection exists but slightly or not at all, and preoccupation still less. In the imbecile we may observe these two modified forms of attention, but they are not quite right. Imbeciles are, indeed, capable of a certain amount of reflection, but it is very limited and applied to their sentiments and not their ideas. We see, in fact, a certain gradation in idiots and imbeciles as regards these faculties, a gradation which is that of the development of the normal individual. The attention is first directed to the sensations and objects which determine it, and then to sentiments, and finally to ideas. Imbeciles reach this final degree only rarely and with great difficulty. They reflect so little that they accept literally whatever is said to them without looking further; this want of reflection explains the extraordinary credulity of these individuals.

Preoccupation, which is not observed in idiots, is encountered only in a very feeble degree, as a rule, in imbeciles. They appear to be remarkably insouciant, which explains at once their lack of judgment concerning the difficulties of existence and their fatuity in believing that they can readily overcome them when they are pointed out to them. Their egoism prevents them from preoccupying themselves with the misfortunes or the distress of others, and their lack of intelligence renders any preoccupations of an intellectual order absolutely impossible. There are some, however, whom we have classed among the absorbed distracted, who appear always to be

under the influence of a vague sort of preoccupation which may occasionally assume the character of a veritable fixed idea. The fixed idea, obsession, is a morbid phenomenon which we encounter frequently in the degenerate, and it is therefore not surprising that imbeciles also present it. In them the fixed idea arises generally under the dominion of evil sentiments, such as vanity, resentment, or violent desires, and it may lead them to commit faults or even crimes under the influence of actual impulsions. Indeed there is hardly anything but evil which can attract the attention of imbeciles, and everything useful leaves them perfectly indifferent. It is this which leads me to say that imbeciles are above everything anti-social. In idiots we can with difficulty attract the attention, in imbeciles we are unable to maintain it; in the former we can determine a utilizable automatism, in the latter we have not even this resource.

Instincts.—We may distinguish two sorts of instincts, personal and social, or instincts which are proper to the individual and others which are proper to the race. The first have for their object the preservation of the existence of the individual, and they are the functioning of the various sensitive and sensorial organs, such as the instinct of nutrition, of sleep, or of locomotion. The latter forms a transition to the second kind of instincts which have for their object to place the individual in relation with his species. The strongest of all of this sort is the sexual instinct, then that of imitation, with which we may include play and natural and artificial language, and finally the instinct of construction and of destruction.

The most powerful instinct and one which is indispensable to existence is that of self-preservation, which manifests itself in two ways, in the search for that which may maintain life and in the avoidance of that which may compromise it. The instinct of nutrition is innate, but idiots who have very imperfect organs, very blunt sensations, and but a vague consciousness of their personal existence are incapable of employing the means necessary to the preservation of life. The most elementary act, prehension, is often wanting, and idiots of the lowest degree are always incapable of feeding themselves. This instinct of nutrition is, however, the first and often the only one which they manifest, as they do by agitation or a grumbling murmur. Certain of these unfortunates at the sight of food growl and bellow, seize the meat with their hands, and swallow it gluttonously. Idiots a little less degraded may express their wants dumbly and may indicate a preference for certain articles of food. Greediness may be associated with this instinct of nutrition. It is frequently observed in idiots, and indeed it is often the only means by which we can act upon them. They often steal from each other the delicacies which their relatives

have brought them. Many eat so voraciously anything that they like that they make themselves ill. But this defect, which is encountered among idiots of somewhat higher degree, is extremely frequent and pronounced in imbeciles.

The sentiment of preservation appears to be absolutely unknown in the most degraded idiots. They have no appreciation of danger, since that demands the exercise of a reasoning power of which they are incapable, and this lack may be observed even in simple idiots. This ignorance of danger, which exposes the child to repeated accidents, is often the thing which leads the parents to place it in an asylum. The imbecile, an egoist *par excellence*, has the sentiment of preservation often extremely developed, even exaggerated. When he exposes himself it is not because he does not know the danger that he runs, but because he does not estimate it at its full value and because he wants to show, in a spirit of braggadocio, that he is able to avoid it. Sometimes, however, suicide is seen in imbeciles; Cobbold regards it as a result of a momentary impulse, basing his opinion on three points, viz., the absence or the insignificance of the determining cause, the absence of the firmness necessary in one who will deliberately commit suicide, and finally the rapid effacement and oblivion of the idea of suicide when once the notion has passed. These persons therefore accomplish the act by an impulse, like the ordinary insane.

Sleep, like the need of eating, is a natural and irresistible necessity. It is the way in which the organism, and especially the nervous system, obtains rest. We might suppose from that that idiots, whose nervous system is the part of them which has least to do, would have need of very little sleep in order to repair lost energy, but this is not the case. There is nothing astonishing in this if we remember that among normal individuals it is those who work the least with their brains who sleep the best, and on the other hand the more one gets into the habit of sleeping the more one sleeps. Thus it is that profound idiots, who seem to be plunged the entire day in a sort of stupor, sleep perfectly well the night through. We may, however, sometimes observe prolonged attacks of insomnia in idiots, instances of which have been reported by Bourneville. But it is worthy of remark that these cases of insomnia are met with ordinarily in young subjects, under four or five years of age, and it appears to be dependent upon some pathological process taking place in the meninges or the brain. After early childhood the usual condition is one of somnolence. It is most probable that idiots are as incapable of dreaming as they are of thinking in the waking state. In simple idiots sleep appears to be less profound and to be affected by the occupations of the day. Sometimes they awake suddenly, start up, and

begin to cry, and then lie down and go to sleep again. Imbeciles dream like normal individuals, and there is no peculiarity in regard to sleep in their case.

The need of muscular activity is reduced to a minimum or even abolished in profound idiots, many of whom are like inert masses. Beaumès attributes to this necessity of muscular movement the tics and other automatic movements of more complex character observed in idiots, but I cannot agree with him in this. We may, however, advert here to certain rather singular motor manifestations which have been noted in idiots; I refer to the "climbers" and "turners." Bourneville has related a very remarkable instance of the first of these peculiarities occurring in a child who never walked normally but always ran, and who could not make any coördinate movements of the upper extremities except as they were associated with movements of the lower extremities in the act of climbing, the child being unable even to seize its food. I have myself seen idiots of the second kind (turners) who would, without any apparent reason, turn round and round, sometimes even until they fell down from exhaustion. We do not know to what to attribute these phenomena, which resemble the automatic acts of epileptics, but they are probably referable to lesions of the nervous centres much more than to a psychical need of movement.

The instinct of locomotion, which is a form of the need of muscular activity, is seldom normally manifested in children under the ninth or tenth month of life. But the execution of this instinct depends both upon the condition of the spinal cord and motor centres and upon the desire of putting one's self in relation with the external world. In profound idiots, however, in whom nothing excites sentiments or ideas, this desire does not exist. As soon as a mere trace of a desire is formed, however, no matter how confused it may be, the instinct of locomotion appears at the same time. It is, for example, that which happens when the idiot recognizes food; he becomes agitated, cries, stretches out his hands, and tries to get nearer to it. The higher is the intellectual and moral plane, the more is this instinct of locomotion developed, although it is always retarded. It develops as a consequence of the instinct of preservation (approaching food or avoiding danger), but it is chiefly related to the instinct of nutrition to which it seems to be subordinate.

The sexual instinct is the most powerful of those relating to the species. In the idiot, in whom no moral or intellectual restraint exists any more than it does in animals, it runs a free course when it is present at all; most frequently, however, it presents anomalies or perversions. It may be diminished or absent, exaggerated or perverted.

As regards its development, there are considerable differences between idiots and imbeciles—here again the distinction between the two being very marked. In idiots, according to the degree of their affection, the sexual instinct is absent or rudimentary; in imbeciles it is exaggerated, perverted, or inverted. The idiot is again extra-social, but the imbecile most commonly anti-social. We have seen that in idiots puberty is generally retarded and sometimes does not make its appearance at all, but this is not the case with imbeciles. Idiots often present anomalies of the genital organs which are incompatible with the exercise of their sexual function or at least with reproduction. In imbeciles, on the other hand, we frequently see an exaggerated development of the genital organs and a normal establishment of puberty.

Among incurable idiots there is no sexual instinct properly speaking, for we cannot regard as a manifestation of this instinct the onanism to which most of them are addicted. Among educable idiots the sexual instinct may appear, but it always remains feeble. Imbeciles, on the other hand, often have an extraordinary precocity, and it is in them that we see the most marked sexual perversions. Among these perversions the most common and the most precocious is onanism. The enormous majority of idiots masturbate, some automatically, others in order to derive therefrom a sexual satisfaction. In the first, onanism appears at a very early age and is comparable to the other tics which these unfortunates present; it is very evident that the sexual appetite does not enter at all into the act, for there is often in these cases cryptorchis or even complete anorchis. Certain idiots, however, derive an exquisite pleasure from their tics, and certainly no part of the body is endowed with such a fine and special sensibility as the genital organs. Among certain educable idiots this habit ceases with the coming on of puberty, and sexual desire and pleasure are not present in the majority of idiots. There are some, however, who appear to experience a satisfaction of this kind, even when very young, when in the presence of girls and women, and they may even attempt to violate them or to make obscene touches.

These perversions of the sexual instinct are seen much more frequently in imbeciles. Onanism obtains among them from the time of puberty much more commonly than among idiots, and it is to obtain sexual pleasure that these creatures indulge in the habit. Girls give themselves up to this practice as often as do boys. Mutual onanism and sodomy are frequent. An interesting point is the coarse character of imbeciles. They love to speak of obscenities, especially before women, accompanying their remarks with gestures no less obscene than their words. Triviality in this regard is as natural to imbeciles as is a respect for the decencies among normal people. The absence

of moral sense and the impulsions of their instinct, which nothing hinders, render idiots and especially imbeciles capable of all sorts of assaults upon women, and the crimes and mutilations often committed by these people after the accomplishment of the rape excite public curiosity by reason of their strange character. In women we see an absolute lack of conscience in the moral sphere, and often they not only abandon themselves to the first comer but even offer themselves to him.

The instinct of imitation exists in simple idiots and is especially developed in imbeciles, but it is far from being as strong as we are accustomed to imagine. As Séguin remarked, imitation is the last expression of muscular action. Now idiots are maladroit and do not know how to manage their muscles. In idiots imitation is automatic, while in normal children it is accompanied by an understanding of the act which is imitated. Idiots often have neither the desire nor the possibility of imitation, either because of the instability of their organs or because of the difficulties of attention or of the weakness of their will. If they imitate, the action is unconscious and cannot be utilized to any extent in their education. The intelligence has little part in imitation, either in idiots or in imbeciles. In the latter it is directed by preference to what is evil; they imitate easily reprehensible acts or coarse words, they make use by preference of slang expressions, and love to assume the manners of blackguards. Another thing which is rather peculiar to imbeciles and which is merely a perversion of their instinct of imitation is simulation, gross and maladroit simulation, of course, but which shows well the perversion of all their sentiments. This desire of simulation leads them to relate all sorts of improbable things, especially as regards diseases. We shall speak of this under the head of veracity and its opposite.

Another thing which shows that the instinct of imitation is not so strong in idiots as is usually supposed, is that it is very rare to see diseases produced in them by imitation, such as echolalia or echokinesis, of which I have hardly seen any instances in idiots. Related to imitation are certain aptitudes which are manifested rather frequently in idiots and imbeciles; such are artistic or, much more rarely, mathematical aptitudes. All the arts do not give occasion equally for the exercise of these tendencies, but it is particularly music which has the privilege of these special aptitudes. Certain idiots who cannot pronounce a word will catch immediately a tune which they will then hum. In the case of other idiots, music will stop their crying, or they time their balancing to its rhythm. This musical tendency is met with quite frequently in simple idiots and also in imbeciles. But it is worthy of note that very often those who

play an instrument spontaneously and reproduce airs which they have heard, are incapable of learning music methodically, and this because of the instability of their attention. It is not rare to note that the parents or grandparents of those who possess such musical aptitudes were themselves distinguished musicians, a fact which shows well the reality of hereditary organic memory. But along with this musical aptitude we may also encounter an aptitude for drawing or for mathematical calculations. Griesinger has observed also that idiots with inferior mental capacity may have a remarkable memory of places, an observation which may be made also of animals, especially of the horse.

Along with the instinct of imitation we may class that of play, although the latter may be regarded as an instinct apart, not only in man, but in all the higher animals. The pleasure which is produced by this substitute for useful activity, says Pérez, is proportioned to the vivacity and exuberance of the mental and cerebral forces, which rise or fall in unison with the degree of nutrition of the nervous centres. We may from this foresee how sluggish will be the play in the idiot whose mental powers are far from being lively or exuberant. Indeed idiots do not know how to play. The parents of idiots will always say that they never played during their early childhood, and that later they did not like and did not know how to amuse themselves with children of their own age. In spite of the varied forms of diversion which are open to them and of the training to which their guardians try to submit them, we never see them play with animation. When a normal child amuses himself alone it is seemingly the intellectual element which comes into play; the child has an object, an idea, which supposes reasoning. In games with other children, on the other hand, it is the motor and emotional element which seems to take the greater part; it is that which shows the first social tendency, for the collective game represents in miniature the struggle for existence. Its principle is contention and victory; it is in this that the pleasure of the game consists, and this pleasure is the emotion caused by effort, by the exercise of functions or faculties, and by success or defeat. The collective game is therefore preferable to the solitary game. Idiots who have but an imperfect consciousness of their physiological needs are indifferent to the superiority of others and are not jealous; they experience therefore no need of play, for they have no satisfaction in exhibiting force, address, or intelligence. Nevertheless, when they play they prefer bodily exercises to games of skill. Walking, which exercises both the physical and the emotional tendencies, is their chief pleasure. Myxœdematous idiots differ a little in this respect from others, and we often see them playing like other

children; they love tranquil, solitary games, and we frequently find them remaining as children in this respect for a long time.

Imbeciles can enter into games, but they naturally bring to them all their faults, and their character comes out then in its true light. The games which please them the most are the noisy games in which they can break, shout, and be brutal. Their games often degenerate into quarrels and end in blows. Imbeciles are jealous and bad comrades; they often cheat, and will use force against even the smallest of their companions in order to gain their point. Of course we do not speak of intellectual games in connection with them, but it is in physical games that they like to engage, and the pleasure they derive from them does not come so much from the feeling they have of exercising the organism as from their self-love and their desire of appearing superior to those about them.

While games are a mark of the social dispositions of the individual there is also another manifestation of the same disposition, namely, the manner in which persons comport themselves in daily intercourse with their equals. This is what is called civility or politeness, and is a product of civilization and of education. We succeed usually quite easily in training simple idiots to habits of politeness, and their manners may often be very attractive; but this is rarely the case with imbeciles. Pretentious and coarse, imbeciles think it witty to be insolent toward their superiors, especially in the presence of their comrades.

There is another instinct in idiots which is also met with in normal children, namely, the destructive, which appears in all children, as the first manifestation of their motricity, under the form of striking, breaking, and destroying. Later this necessity of expending energy manifests itself in constructivity, but the instinct of conservation does not appear till later yet. In the idiot these tendencies are much more marked, but the lower he is in the scale of intelligence the less developed are the instincts of construction and conservation. Most of them break for the mere sake of breaking, yet it is doubtful whether they really experience pleasure in it. Indeed they are not content with mutilating objects about them, but they even mutilate themselves. What is most often seen in imbeciles is the necessity of breaking, of destroying, an impulse which has received the name of clastomania. When older they injure or destroy objects, no more through a sort of impulsion, but with the design of doing harm; it is an abnormal satisfaction which they seek. All are not thus, but we ought always to be on our guard, for one of the most frequent forms of their destructive activity is pyromania, and sometimes even they have homicidal tendencies.

Sentiments.—Pleasure and pain are the fundamental emotions, united to all affective phenomena, whence come the sentiments. In profound idiots the sentiments and emotions may be non-existent, even the most elementary affective phenomena being absent, and there need be no occasion for surprise in this when we consider that these creatures are incapable of recalling what has taken place around them. Nevertheless, even in the most degraded, we may sometimes be surprised by movements expressive of pleasure or pain, of joy or sadness, even of anger, provoked by physical sensations such as, for example, those connected with their alimentation. Sometimes their movements of joy or of sadness do not seem to be produced by any cause, but appear rather to be the result of unappreciable modifications occurring in the brain. We see them sometimes begin to laugh, or more often to utter cries, to become agitated, to strike out, at the same time that the face becomes congested, all without any apparent cause, after which they fall again into their apathy or resume their automatic movements. Among the lowest of these creatures pleasure and pain, even very severe pain, appear to be scarcely felt, as is proved by cases of automutilation. Moral pain is *nil* in profound idiots, but appears in slight degree in those of higher grade. We rarely see idiots cry from moral causes. In the imbecile physical pain is felt much more sharply than moral. Imbeciles are very egoistic and occupy themselves above all with their physical well-being. They are easily disturbed by the least pain which they suffer, and give expression to very lively signs of grief, contrary to what we see in idiots; but as regards moral pain, they betray a remarkable indifference to the causes capable of producing it. The best way of making one's self liked by them is to make them compliments which they accept greedily, no matter how exaggerated they may be.

As regards the sentiment of pleasure in general, it is as obtuse as that of pain in the idiots of lower degree. It is often impossible to determine whether the sentiment which we have aroused in them is one of pleasure or of astonishment, and it is very possible that it is neither one nor the other, but is a simple reaction to a physical stimulus. Laughter, like crying, is exceptional in profound idiots, but the less degraded know how to express their pleasure by laughter, clapping of the hands, or cries.

Very different is the character of the imbecile. Heedless of aught else, he gives himself up wholly to the pleasure which he feels, and which is capable of alone occupying his attention, although it must be frequently changed. He will amuse himself at anything, no matter what, rather than work. Instead of being concentrated, like the idiot, he is expansive. His ill-regulated imagination runs riot, and

nothing astonishes him, no matter how improbable it may be, his judgment and his reason being wanting. He manifests joy in a noisy manner, out of all proportion to the cause of it, getting more and more excited, and sometimes not even knowing why he laughs. The idiot does not laugh when he does not understand, and consequently he laughs rarely, except when he laughs continually as may be the case with certain incurable idiots who giggle constantly while making their balancing movements; in such case the laugh is a true tic with the execution of which the intelligence has absolutely nothing to do. The imbecile thinks he understands everything and laughs without motive, even perhaps under sad circumstances, if some little thing which he thinks funny attracts his attention. Sometimes we see spontaneous attacks of causeless laughter in idiots as well as in imbeciles, and these are often the first thing to direct the attention of the parents to the mental condition of their child.

Related to the sentiment of satisfaction which the obtaining of food gives, the first sentiment which we encounter in the most degraded idiots is attachment to the person who takes care of them; this is a rather vague sentiment at best and it is readily transferred to another person, so that it appears to be addressed less to the person than to the care which the idiot receives. In less complete idiots this attachment becomes more marked, for their attention and their memory are more developed, and consequently comparison and preference between several persons and several ways of being cared for may be established. Idiots smile at the approach of those who speak gently to them and who give them what they desire. Nothing can be gained by speaking bruskly to them, but they appreciate perfectly kindness, and especially the absence of restraint.

In proportion as the intelligence is developed affection assumes a character approaching more and more the normal—that is to say, an affection founded not only upon sympathy but even more upon a choice between certain persons. Imbeciles, on the contrary, have but little affection. They readily forget persons who have shown them the greatest affection. They hardly manifest any natural feeling towards their parents, and prefer any pleasure to that of seeing them. In this they show themselves to be anti-social *par excellence*, for we cannot understand sociability without the existence of sentiments of affection towards the individual and the family.

Let us now consider certain sentiments which have a purely moral or psychical base, such as filial love, friendship, and sexual love. We are unable, of course, to examine profound idiots in this direction, but simple idiots are certainly capable of filial affection, though of a very mild form. Some, however, appear to have no sentiment

of affection for their parents, while showing a very lively affection for their sisters or brothers, manifesting sometimes even great jealousy. In imbeciles filial love is, like everything else, most unstable. They care not the least for what may happen to cause their parents grief or pain. Very often we see in them a perversion of the affective sentiments, and instead of showing affection for those who love and spoil them they abuse and scold them, using the vilest expressions.

Friendship is rare in idiots, although we occasionally see some who are always together in play and who sympathize with each other. In imbeciles this manifests itself especially under the form of an interested association. Certain ones may unite to commit evil deeds, bringing into their association gentle idiots of weak character to aid them; these foment disorder, organize escapes, and incite to insubordination against the guardians in asylums; they are the leaders who always try to escape punishment themselves by fastening the blame on the weaker.

Affection for animals is absent in profound idiots, and scarcely exists among the less degraded. They do not seem to understand that animals are capable of suffering, and they kill them but without voluntarily torturing them. The imbecile, on the contrary, is refined in his persecutions. He loves to make animals suffer, to mutilate them, and to hear them cry. He loves to do evil for evil's sake. In the idiot cruelty, when it exists, is due to the total absence of affective sentiments and of intelligence at the same time; but in the imbecile it is due to a perversion of the moral sense, which is worse and much more difficult to correct.

Does sexual love exist in the idiot? Evidently not in the profound idiot, nor even, we believe, in the simple idiot. But it certainly exists in the imbecile in whom it has an essentially physical substratum. There is no such thing in him as Platonic love, for the imbecile is extremely lascivious; he loves to talk obscenely, especially before women; and in his swearing his tendency is to employ as oaths only words which have a reference to the genital organs or their functions. Imbeciles frequently practise sodomy, but are very inconstant in their unnatural loves. Nevertheless, in girls as well as in boys, love does exist, and their sexual instinct is sometimes even very strongly developed. But we seldom observe in them a sentiment which is correlative of love, namely jealousy, while it may be seen in idiots.

The sentiment of commiseration is one which marks a great progress toward sociability; it proves that man understands the feelings of his fellows. The profound idiot is perfectly indifferent in the presence of a person who is suffering, for he does not understand it

at all. The idiot of a higher degree is astonished; he regards the sufferer closely and instinctively begins to imitate his grimaces. The simple idiot sometimes appears to take pleasure in seeing one of his comrades suffer. We know to-day the important relation which exists between the play of the expression, the passional attitudes, and the emotions. In the idiot we may indeed observe a play of expression reproducing automatically the expression of suffering in another, but this mimicry does not awaken in his mind the correlative emotion. He may possibly even rejoice, observing that the other suffers while he himself does not suffer.

Analogous phenomena may be seen in imbeciles, but with certain differences. In the presence of another who is suffering the imbecile expresses fright rather than commiseration. If his comrade is punished he takes his part. If two of his comrades are fighting he takes pleasure in the blows received by them. When the imbecile takes the part of those who are being punished it is rather through a moral perversion than through pity; far from defending the justice of the punishment he rebels against it and against the master who applies it. His instinct of solidarity is awakened only when there is a question of something harmful. When he witnesses a fight it is without any pity for the one who receives the blows. The feeling of pity, indeed, scarcely exists in him.

The idiot is extremely timid; everything frightens him because he cannot explain anything. When any one whom he does not know approaches him he immediately assumes the defensive or runs away. This timidity enables us sometimes to educate idiots better than imbeciles, for the latter fear only blows, and when they are excited they fear nothing.

Does courage exist among idiots and imbeciles? Among idiots I know of nothing which would authorize us to say that it does; and as to imbeciles they are certainly cowardly, and if they ever do anything which is apparently courageous it is because they are unconscious of the danger, or they act in obedience to an impulse. Courage which is calm and deliberate, a rare virtue even in normal man, is entirely absent in these creatures.

Impulsiveness and irascibility, which are the apanage of inferior races, are frequently encountered in idiots. Their anger is without reason and often of extreme violence; it is frequently seen at a very early age, and indeed is sometimes one of the first symptoms of their condition. But as between idiots and imbeciles we remark always certain differences upon which we cannot insist too strongly from the social point of view. In these accesses of rage the idiot does injury to himself or attacks inanimate objects, smashing and breaking them

at the risk even of injury to himself. The imbecile, on the other hand, falls into a rage only against persons; he is wicked in his rage and seeks to do harm; his attacks of anger may even become maniacal in their intensity.

We may now study two of the most important social sentiments, viz., solidarity and the love of possession. The sentiment of solidarity, which is absent in profound idiots, is very slight in attentive and relatively curable idiots. It appears in marked form only in imbeciles, but in them it is directed against society, its object being either to aid another in his pursuit of vengeance, to do evil with his aid, or to defend him when unnatural relations exist between the two.

As regards the love of property, profound idiots naturally present no trace of it, but in idiots of a higher intellectual plane it may sometimes attain quite a considerable degree of development. Such will fill their pockets with all sorts of objects of no value, but to which they attach one, and which they want to save. They do not hesitate to appropriate anything they want, especially if it be food which more than anything else excites their desires. There are some who have a special propensity to steal. It is, however, especially in imbeciles that this tendency is most marked, and in them it often has the nature of an impulsion, constituting then cleptomania. But most commonly their thieving is frequent and habitual, or occasional, but is not in response to an impulsion. Their thefts are very like those of general paralytics; a certain number, however, steal like ordinary thieves. Although these subjects have no respect for the property of others, they have it in a high degree for their own, and they will defend what belongs to them energetically and roughly.

Alongside of the love of property there is another condition of well-regulated society, namely, the acquisition of property, that is to say, work. Labor, which is impossible in profound idiots, is obtained with difficulty from those of higher level, their laziness requiring them to be continually stirred up. Their want of attention and the slowness of their conceptions and movements prevent them from feeling any need of activity. This is, however, not real laziness; it is rather inactivity. Besides, if we know how to set about it we can get work out of an idiot; indeed, he often even loves his tasks and seems to be very proud of the confidence reposed in him. Very different is the imbecile, who is fundamentally lazy, and consistently and systematically refuses to work unless some special inducement is offered, or unless he fears punishment or the deprivation of some pleasure. Once trained to a certain work, idiots do it tolerably well. Imbeciles undertake anything they are asked to do, but abandon it as quickly as they began it; they pretend that they can do it only in

their own way, and usually do only the most absurd things. In this respect they are much less utilizable than idiots.

What is the degree of the development of their sentiments of right and of duty? The sense of right, which is correlative to that of property, is, as we may well imagine, very slightly developed in idiots, or rather it is not developed at all in them. They have, indeed, some notion of the rights which their guardians may have over them, but these rights are not invested in the guardian as a man. In imbeciles, on the other hand, we observe a great tendency to insist upon rights to which their degree of intelligence scarcely entitles them. With their natural fatuity they think themselves the equals of other men, and they insist the more upon their rights as they understand them the less and are the more incapable of seeing when they ought to make them respected. They are always ready to demand justice. "Might makes right" and "the most forcible reason is the best" are their two favorite maxims. In them every desire becomes a need and every need demands immediate satisfaction. When they say, "I have the right to do that," we are to understand, "who can prevent me from doing that?"

The idea of duty, which is incomprehensible without the idea of right, is, like it, absent or rudimentary in complete or profound idiots. The egoistic sentiment being the most natural to man, and the altruistic sentiment being, on the contrary, a product of the reason, either conscious or not, it naturally follows that the sentiment of right, primarily a selfish one, appears much more readily and earlier than that of duty, which is altruistic. The first is encountered in the lower degrees of humanity, the second in beings who are more developed intellectually and morally. There is a difference in this respect between the idiot and the imbecile, which shows that duty belongs rather to the moral than to the intellectual sphere. The idiot is capable of being trained, up to a certain point, to do his duty; but in the imbecile this is accomplished only with difficulty. Now, while the moral sentiment is rudimentary in the idiot, it is deviated and perverted in the imbecile, which is worse. This absence, or rather this deviation, of the moral sentiment may be such that it constitutes in itself a mental trouble, called moral insanity.

One of the necessities of social life is the idea of authority. Simple idiots have, like children, the notion of authority to which they are obliged to submit, and they understand very well the tone of command, whether resistance is possible with them or not. Idiots are in general fairly obedient, because they seem to feel the weakness of their will and that its force is insufficient to counterbalance the authority of their masters. Imbeciles, on the contrary, are disobe-

dient because they think themselves equal to those who ought to direct them; they are disobedient through lack of judgment. When they are gentle they may be obedient, but most frequently it is fear, brute force, which makes them yield. But the less ready they are to obey the greater is their love of domination over others.

In the presence of beings endowed with such sentiments, what rewards or what punishments are best adapted to encourage them, to develop and bring out their good sentiments, and to suppress their bad ones? Idiots can be but little influenced by purely intellectual or abstract rewards, such as marks and standing in the class; they are more sensible of punishments than of rewards, of pain than of pleasure, of blame than of praise. Furthermore, the want of attention in idiots weakens singularly the effect of reward or of punishment, and in any case this effect is of very short duration. The fear of punishment hardly exists in the idiot. But there is usually no great need of resorting to a system of encouragement or repression in the case of idiots, they have scarcely any innate wickedness, and all that is necessary is to impose restraint upon them to prevent them from doing wrong, since most commonly they act without any special intention. In imbeciles we might expect to obtain quite a measure of success in this respect, for they are very susceptible to praise or blame, more to the first than to the second. The rewards which act best with them are those which flatter their self-love, naturally so exaggerated. The giving of prizes and the public bestowal of praise have a marked influence upon them, but unfortunately only a momentary one. They often also profit by the praise which has been bestowed upon them to believe that everything is now permitted to them and to give free rein to their evil inclinations. We ought, therefore, to be very circumspect in the way in which we compliment them.

The effect of punishment is also very evanescent, and its disadvantages are as great as those of rewards. Every punishment appears to the imbecile to be an abuse of power and an injustice, and he treasures the remembrance of it in the hope of vengeance. The more superior they think themselves to be the greater appears to them their humiliation; but there is no hope that they will reform or that they will repent sincerely, for their only desire is to commit again the same faults without being found out. The absence of moral sense leads them to believe that they owe nothing to anybody, either to their parents, or to their masters, or to those who have the care of them, and when forced to yield they simply rebel. Thus moral sentiments have but little influence on them; they are indifferent to them or bring them forward only when they want to show off before their companions; the best means of punishing them is therefore to

take away from them this satisfaction. Isolation for a time in a cell is a very efficacious means. We ought always to act with them without discussion and without any anger. We must remember that scarcely anything has any influence over them and that they are the most undisciplined persons imaginable. They are consequently very difficult to retain in the family, and the older they grow the more impossible becomes their presence in a social community.

We may conclude from what has already been said that religious sentiments and any motives of action having religion for a basis are absolutely unknown to these creatures, and are incapable of influencing them in the slightest degree. We never find the least idea, however vague, of a divinity or of any force above and external to the world. They are incapable of rising even to fetishism and superstition, for they are astonished at nothing, not even the great phenomena of nature. Imbeciles differ but little from idiots in this respect; they have too little curiosity concerning the things which surround them to inquire as to the why and the how of life. Everything seems to them simple and easy to understand.

There is one very complex sentiment, rather peculiar to man, namely, shame, in whatever way it may manifest itself. As a rule this is not observed in the idiot, although there are some who are very modest, probably as the result of education. Imbeciles certainly have the sentiment of shame, for they know how to shock it, and we have already spoken of their love of obscene speech and coarse expressions relating to the sexual organs. Among those of equal intelligence girls are less shameless than boys.

Timidity is a sentiment related to shame. Idiots are ordinarily very timid, but imbeciles have a fatuity, an arrogance, an aplomb, which come from their feeble intelligence and which prevent them from being conscious of their inequality with those about them, or of the inane things which they say with an absolute unconsciousness. Modesty is foreign to them, and their impulse to boast is such that they often invent stories out of whole cloth which many times are far from being to their credit. The same is not true of idiots, whose imagination is moreover too feeble to enable them thus to invent situations which have never happened.

Vanity and coquetry are frequently observed in these unfortunates, and are often a powerful means of acting upon them for their instruction and education.

We have seen, in studying the instincts, that certain idiots and imbeciles possess artistic tendencies, especially as regards music, but less for drawing or sculpture. It is of interest to know now whether they experience any æsthetic sensations, whether they are capable of

discerning what is beautiful and what is ugly or of feeling a true emotion in hearing music or looking at beautiful things. In listening to a concert idiots show a degree of attention mingled with respect, and they applaud with a certain discernment. The most solemn and imposing parts, and music such as that of an organ or of string instruments, especially arouse their enthusiasm. What appears to influence them most is rhythm; thus they listen with pleasure to the recital of beautiful poetry, although they do not understand a word of it. Séguin says that he has seen idiots who sang true, although they spoke badly or with great difficulty. They are also more sensible to instrumental than to vocal music. Wildermuth recognized the fact that the musical sense was relatively strongly developed in idiots, being indeed the only artistic sense represented in them, and he therefore favored the cultivation of singing among them and also of dancing, which is associated with music in exciting coördination of movements. Séguin, on the contrary, regards music as more harmful than useful in the education of idiots. I believe, however, that Wildermuth is entirely right. The idiot loves rhythmical sounds and cadences of whatever sort. The special intonation in the giving of commands is of great importance also, and independently of the sense of the words he understands the tone of caress or of menace, of affection or of anger.

The appreciation of beauty is very rare; it is confounded with the love of size, brilliancy, or novelty much more often than with that of harmony of forms and colors. For many idiots an object is beautiful if it glitters; they collect pieces of glass or of porcelain, the cut ends of hard woods, metal buttons, etc.

While the idiot loves the colossal which he confounds with the beautiful, the imbecile loves the grotesque. In drawing he loves fantastic monsters, which he knows do not exist. He uses curious words which have no sense, and draws absurd comparisons.

What most strikes idiots and imbeciles in paintings, drawings, or sculpture is the exact resemblance to what they know. For them art is the representation of nature and not its interpretation.

Since an æsthetic emotion, by awakening all that is most hidden in the personality, causes a more or less strong impulse to activity, we should seek for all means possible to develop in these creatures whatever is capable of exciting in them an æsthetic emotion of any kind.

We now come to the last class of sentiments, namely, the intellectual sentiments, astonishment and curiosity, which are derived from attention and credulity, and with which are associated veracity and lying. *Astonishment* is one of the most effective means of arousing

the attention, but its effect is fleeting and it is unable to hold the attention long. Unfortunately, astonishment is rare in the idiot, although perhaps less so than in the imbecile. Even when we succeed in arousing it, it is of but short duration. The astonishment which is excited by noise appears to be more marked than that aroused through the sight; we see the same thing in young infants.

Curiosity is an almost necessary consequence of astonishment, and it manifests itself very early in the infant. It is a natural instinct. In the profound idiot there is complete indifference. The simple idiot would like to know but he does not dare to ask. The imbecile puts any question but does not wait for a reply, his instability making him forget what he has just said. The idiot, inattentive, timid, but without pretension, seeks to understand if we know how to secure his attention a little. The imbecile, on the contrary, incapable of maintaining his attention, passes from one subject to another without any connecting train of thought, without regrets or desires, speaking for the sake of speaking, asking questions in order to get noticed as often as possible, and is incapable of waiting long enough on any point to be instructed in it.

But in order to learn it is not sufficient to understand, one must also believe. As regards *credulity*, idiots and imbeciles resemble each other very much. The idiot is in general confiding and he is credulous. We must therefore be on our guard against abusing his confidence, for fear of giving him false notions which his judgment would be incapable of setting right. The credulity of imbeciles seems sometimes to be almost beyond belief, so absurd is it; and in conjunction with this extraordinary credulity there is often, as regards realities, a no less absurd incredulity. In fact, there is in the imbecile's mind a complete lack of equilibrium. He readily believes whatever flatters him and accepts the most extravagant compliments. This condition easily passes on to megalomania, which sometimes assumes the characters of a true delirium analogous to that of the general paretic. In some cases, as Séglas has remarked, there may even be more or less difficulty in arriving at a diagnosis between these two conditions.

Imbeciles love the fantastic, the improbable, and the marvellous, just as do infants, and they readily come to believe in them. Furthermore, it is more easy to believe than not to believe. Doubt is the beginning of criticism, which implies experience, judgment, reasoning, comparison, and which supposes a fairly developed and contained intelligence. Credulity is a natural consequence of a defect of the intelligence.

In the child *veracity* is in proportion to credulity. We must dis-

tinguish between a belief in the veracity of others and the tendency one has in one's self to be truthful. An idiot of mild degree has certainly an idea of truth. If you speak to him concerning something that he does not know, he will regard you fixedly as if asking for a more categorical affirmation. The imbecile unquestionably has an idea of truth, for he lies unconscionably. The idiot lies also, but less than the imbecile, for he has not the latter's power of invention. The idiot is content with denying what one questions him about or accuses him of, but the imbecile invents an explanation and seeks for proofs to the contrary, proofs, moreover, which are usually absurd and improbable. All the motives for lying which we encounter in children are met with also in imbeciles, but in exaggerated form. First of all, self-interest is the chief motive, but there are some who lie for the pleasure of lying when there is no necessity for it whatever. Their testimony should never be sought, and if it is offered spontaneously it should always be regarded with deep suspicion. Gluttony and the fear of punishment are powerful incentives to lying. Laziness also leads them to pretend to be sick when they are not, and they invent a thousand imaginary ills, contrasting in this respect strongly with idiots, who do not know even how to express the nature or the seat of their sufferings.

Alongside of lying we have to note stratagem, which is related to it in certain respects. It is well developed in idiots and especially so in imbeciles; in the latter it may assume the appearance of acts intelligently conceived and executed. Some imbeciles are most extraordinarily skilful in eluding surveillance. They resemble greatly in this respect primitive men, who seek to procure by ruse what their strength or their intelligence cannot obtain for them.

Expression of the Emotions.—We have now to examine into the manner in which idiots and imbeciles express their emotions by gesture and physiognomy, and also their usual condition—that is to say, their humor or their character.

That which first strikes us in the attitude of idiots, whatever their degree of idiocy, is the entire absence of grace; and as regards their face, the ugliness of it. The incurable idiots are not always the ugliest, for ugliness develops with age and profound idiots are short-lived. They are ugliest at about puberty, however, and when they reach this period of existence they commonly show the most repulsive faces, and present all the stigmata of profound physical degeneration. There is little to choose, in this respect, between the microcephalic, the hydrocephalic, the myxœdematous, etc.

Certain authors, Langdon Down especially, appear to affect a great predilection, in their classification of types, for comparison

with the different human races. I must confess that I have never remarked any particular resemblances in this respect, or that there is anything peculiar to idiots in such resemblances. I believe also that those are absolutely on the wrong track who endeavor to see in idiocy an atavistic manifestation. Furthermore, the idiot never presents a pure type. His type is not an atavistic one, but one of degeneration —a very different matter.

I shall not repeat what has been said concerning the external appearance or the habits of idiots in the different classes, and their tics, which we have considered in connection with their physical condition. But we have to study their character. Nothing is more difficult to analyze than character, even in normal individuals, and especially in children; we can hardly judge of it except by its external manifestations. Its study will therefore be all the more difficult in idiots, in whom the reactions are weaker and more indefinite; we can hardly do more than note certain peculiarities.

Profound idiots are sometimes subject to sudden changes of humor without any apparent reason. The face may suddenly express anxiety and the idiot shows himself refractory. In simple idiots we may observe queer acts, capricious movements which we are unable to understand. Sometimes they have true maniacal outbreaks, rage against themselves, strike the head against the wall, break whatever they can get at, and cry out. It is probable that these attacks are dependent upon circulatory troubles in the brain. Most writers distinguish two forms, the anergic and the erethic, but we are less likely to preserve this distinction as we observe that it is far from corresponding to all the cases.

In idiots of mild degree the underlying trait of the character is the inconstancy and obtuseness of the sentiments, together with weakness of the will. The humor in which they are depends entirely upon their surroundings and the manner in which they are managed. When they are well taken care of they are usually affectionate, docile, happy, and sociable, but are on the contrary bad and malicious when they are maltreated. In some we occasionally observe a melancholic disposition, but in others there is a constant over-excitement.

The aspect of imbeciles is very different from that of idiots, and this is due to the absence of the stigmata of physical degeneration, which are rather rare in the former. They carry in their person an air of sufficiency, of contentment, proportionate to their ideas. Undisciplined, obeying only through fear, violent especially with the weak, humble and submissive to those whom they feel to be stronger than themselves, they are egoistical, boastful, and nearly devoid of affection. They frequently have fits of rage, are cynical, and are

sometimes wicked to the last degree. Careless and satisfied with themselves, they think only of distraction and of the means of shirking work.

The physiognomy is rather mobile but with little expression nevertheless, for the changes occur irregularly and like the ideas follow each other without order under the influence of any chance external impression. They express exactly the momentary impression produced, without any modification occasioned by a previous mental condition. As soon as the impression ceases the physiognomy takes on again its indifferent expression, the eyes lose their passing vivacity and become again vague and undecided.

Some of these creatures occasionally are rather droll in their sallies and repartee, though usually coarse. They recognize the ridiculous or grotesque side of people and have a tendency to exaggerate it. It was from this class that the fools and jesters of former times were recruited. But very often they are not content with being simply mockers. They are malicious, and by their evil speech or their calumnies they make trouble wherever they may be. They interpret the actions of others in the worst way, they are full of gossip and incapable of keeping to themselves what they know or think they know of others, and it always causes them pleasure to see the harm that they have done. We can readily imagine, therefore, what very dangerous people they are unless those about them are forewarned and take precautions accordingly.

Language.—Although some have sought to base a classification of idiocy upon the development of the power of speech in these creatures, the facts brought forward by those who have studied language in all its manifestations in idiots and have compared this with what occurs in normal children, are far from justifying such a classification. Wildermuth justly remarks that the different forms of idiocy do not present as profitable a field for study in this respect as we might suppose. There are in these patients associated intellectual, sensory, and motor troubles which form a very complex picture, the analysis of which is singularly difficult.

Before undertaking this study it will be necessary to establish certain points concerning the relation of language to the development of the intelligence. Those who have endeavored to base their classification of idiocy on the development of speech have imagined that there was a direct relation between these two, and at first glance there does seem to be such a relation. We soon find, however, that the development of language is not correlative with the degree of intellectual development in normal individuals or in idiots. Kussmaul, Preyer, and others deny positively any such relation, and they cite many cases of

intelligent children who are deprived of the faculty of speech, although not deaf-mutes. There are idiots in whom the power of language is relatively well developed, although their degree of intelligence is no greater than that of other idiots of their class. Such, for example, are the microcephalic. The speech faculty is therefore no measure of the intellectual development. What has erroneously led to this belief is the rôle that language plays in the development of the intelligence and of ideas, of which it facilitates the acquisition. But here there was of necessity first the soil, the latent intelligence capable of being cultivated, of receiving, and of understanding the ideas which are sought to be impressed upon it. What we have to consider is not the language of individuals but their aptitude for understanding the language of others.

There is, however, another consideration which seems to me to decide the question summarily. This is to be found in the pathological anatomy. Since the greater or lesser degree of intelligence of the idiot depends upon the greater or lesser extent or depth of the lesions of the brain, and upon their location in the encephalon, it is easy to understand that if the language centres, or rather the centres of the various images of words, are intact, language may be preserved entirely or in part, while the intelligence is not necessarily any more lively on that account; and that on the contrary, if the principal lesion has affected almost exclusively the motor or any other of the centres of language, the intelligence will be but little diminished. We thus see that if the faculty of language is no criterion for judging of the degree in intelligence in normal individuals, the lesions which cause idiocy themselves forbid us to take this faculty as a basis upon which to found our classification of idiocy.

The vocabulary of idiots, says Dagonet, is very limited. They scarcely articulate and pronounce distinctly only monosyllables. It would seem from that that the highest degree of speech in idiots is the interjection or the monosyllable. As Kussmaul remarks, the interjections and imitative gestures and sounds are the beginnings of pantomime and speech, but they do not constitute the whole of them. To speak is to comprehend one's self and others. Idiots of a certain degree attain fully to this level.

One of the chief characteristics of all grave cases, says Griesinger, is the absence of the faculty of language; this idiotic mutism must not be confounded with deaf-mutism; it is either due to the absence of ideas—the idiots do not speak because they have nothing to say, or they are unable mechanically to express what ideas they have by reason of some anomaly of the organs of speech. We believe, however, that this want of power is due not so much to an anomaly of the

vocal organs as to some alteration in the language centres in the brain. As regards simple idiots, Griesinger admits that they can pronounce a certain number of incorrect phrases; almost always they employ the infinitive of the verb with some interjections. They frequently repeat phrases or fragments of phrases which they do not understand; they interpose words which have no connection with the subject; and finally their pronunciation is defective.

No author has ever examined whether the phases of the acquisition of language were similar or the same in idiots and in normal children. Séguin, who paid special attention to the education of the faculty of language in idiots, formulates no rule in this respect, limiting himself to certain precepts concerning the best means of teaching language in them. Other authors have been content with saying that the speech was more or less defective. According to Esquirol, speech is easy and free in the first degree of imbecility; in the second degree it is less facile and the vocabulary is more limited. In the first degree of idiocy, properly speaking, the person has the use only of very short words and phrases. Idiots of the second degree articulate only in monosyllables or cries. Finally, in the third degree there are neither phrases nor words, not even monosyllables. We readily see how little precision there is in such a classification.

The rapidity of linguistic progress is no sign of a precocity of intellect. On the contrary, according to Perez, bright children express themselves in words later than others, and this for the reason that they do not content themselves merely with the harmony of the words, but must have mental pictures of the things of which they speak. In the idiot we usually observe a tardiness in speaking just as we do in walking, in the use of the hands, etc. But, contrary to what happens in the case of normal children, they understand no better than they speak; the delay is not merely in the development of the language centre but in that of the entire brain. We must therefore distinguish between the modes of delay in the acquisition of speech. While the normal child has aphasia of transmission, the idiot has at the same time aphasia of reception, and as his brain is still a blank as regards language, he has no image of words which would serve him to make himself understood, such as the sensorial aphasic has.

The same is true of the repetition of words which is observed in both idiots and normal children. As regards the latter, we may believe with Perez that there is in this meaningless repetition of words a distraction and a rest for the speech centre. But while allowing his centre of articulation to functionate automatically, the child continues to think and acts in accordance with his thoughts. In the

idiot, on the other hand, this repetition of words becomes a true tic. He does not repeat the same word or the same phrase for a few minutes only, he does so continually, apropos of anything or of nothing, without being able to stop, and it is often sufficient to pronounce some word or sentence in his hearing to set him off repeating it without end; this is true echolalia. The idiot, furthermore, does not suit his actions to what he is saying. In the idiot the independence of the idea and the word, a question which philosophers are still debating, seems to be very manifest. Idiots, however, who have a very limited vocabulary nevertheless know a tolerably large number of things and are capable of certain works which must be understood and which demand a certain application; and the best proof that their intelligence is applied to the execution of such works is that they gradually perfect themselves in it. They see beforehand what is going to be done, but this demands a certain exercise of reasoning power which, however, they would probably be unable to formulate. In this they are comparable to the animal that divines what his master is going to do, in virtue of his previous experience, just as does a man, but with this difference, that he reasons without words by means of simple images. We see from this that the higher the intelligence mounts the less becomes the independence of the word and the idea.

Let us see now under what influence language develops. We have said that most frequently, if not always, there is a considerable delay in the appearance of the faculty of speech. The prattle and stammering of infants, the first rudiments of speech, are absent in the idiot or appear very tardily, a fact which always strikes the parents of these creatures. On the other hand, they often give voice to hoarse cries of which no one can divine the meaning, as they express neither pain, fear, nor anger. Not uncommonly these cries come in regular attacks which are so persistent and so prolonged that the presence of the patient becomes unbearable. Egger says that it is possible to note the commencing transition of the cry to a voice sound in infants as early as the fifth week. In idiots, however, especially the incurable ones, even those several years of age, the cry has no intonation, and indeed it is natural that it should not have since it responds to no definable sentiment. This default of predisposition to speech shows itself then very early in the absence of the first rudiments of language and in the absence of any intonation in the cry.

At a later period the action of imitation comes in in the reproduction of the sounds which have been heard. In the idiot we see no attempt at imitation, not only at the age of nine months, at which time it is supposed that the normal infant begins to imitate, but even much later and sometimes throughout life. If imitation played so

considerable a rôle as has been attributed to it in the development of language, we might well be astonished that speech remains always so imperfect in the idiot, in whom we are accustomed to say that the instinct of imitation is strongly developed and that it is by means of this instinct of imitation that we are able to educate him sometimes. But, as I have before remarked, this instinct is far from being so strongly developed in the idiot. In order to imitate one must pay attention and be capable of reproducing what one sees. But in the uneducated idiot the attention is rudimentary or absent. How then could he be led to imitate sounds to which he has paid no attention whatever? It is often indeed this very lack of attention which causes what Griesinger justly calls idiotic mutism, of which he distinguishes only two varieties. There are, however, in my opinion four varieties, namely, mutism from absence of ideas, mutism from a central impossibility of expressing the ideas, mutism from defect in the organs of speech, and mutism in consequence of deafness or pseudo-deafness. Séguin believes that mutism results from two causes almost always acting together, but which it is necessary to attack separately; these are the physical inability of directing the vocal organs to form words and the want of intelligence.

We might, I think, compare these speech defects with aphasia, and distinguish motor aphasia and aphasia from verbal deafness, putting aside the impediment to speech caused by anomalies in the vocal organs. In the first category we should have to do with idiots who cannot speak, although understanding nearly all that is said to them, as is shown by their obedience in doing what they are told to do. In the second class are those who do not understand a word of what is said to them and are themselves incapable of uttering a single word. Such are the incurable idiots, who are, however, not deaf, as is shown by the fact that they will turn round when a loud noise is made near them. There are others who appear deaf not only to words but even to all sorts of sounds, but who are nevertheless not deaf. Their deafness is only apparent and is due solely to their lack of attention.

Finally in the third stage of language development the child learns to connect his ideas and his words. This is the most difficult part to effect in the idiot. There are some who arrive at a point where they can repeat tolerably well not only words but even entire sentences without ever understanding the sense. This is an additional proof of the independence of the idea and the word. Some idiots stop here; they can be brought to articulate but cannot go further, and this relation between the idea and the word escapes them entirely. Among others of a higher degree of intelligence we observe that the power of speech is arrested at one of these stages of language prog-

ress in the normal child, at that namely in which he expresses himself by simple repeated monosyllables and by the infinitive of the verb, and in which he often interjects certain syllables and pronounces certain letters badly.

According to Kind, non-congenital idiots are sometimes great chatterers, and that under two circumstances: (1) in subjects who have acquired a certain degree of education before becoming idiotic, the words roll out mechanically in a most confused manner without any combination of ideas, or, contrary to what occurs in the logorrhœa of the insane affected with disorders in the ideas, without any grouping around a central idea which continually crops out through the others; (2) in certain subjects whose ideas, produced by the stimulation of a sense, are so little fixed that at each instant a change of stimulus causes a new idea to come to the front with a new word associated with it. The two states may also exist together.

Wildermuth distinguishes two kinds of dysphasias and lalopathies which may be encountered in idiots. The first are those in which the trouble of speech is the direct expression of the trouble of the intellect. From the completely dumb idiot to the backward child who is capable of education, the speech trouble corresponds to the narrow circle of the conceptions of these beings. They have no rich store of words, and rapid association is absent. We meet among them a large number of cases in which the degree at which the psychical life together with its principal expression—language—has been arrested, has its analogue in the steps which the normal child must ascend in his intellectual and verbal development. In the lowest degree the idiot resembles an infant during the first week of life; it is merely a reflex vegetative automaton. In the next higher degree we see a child of a year and a half to two years, who emits onomatopoietic monosyllables. Finally, the idiot's store of words increasing, he acquires a baby's speech, that of a child of two or three years. The verbs are employed only in the infinitive; the individual speaks of himself always in the third person; but he is capable of writing words correctly. In this group are ranged also those defects which resemble the incertitude of an adult learning a foreign language; the speech and articulation are correct, but there are false adverbial designations, pleonasms, paraphrases, and confusion of words. We place here also the impossibility of pronouncing correctly (lisping of the backward), dysphasia due to an imperfection in the development of the conception, translated by a dragging speech or much talking with constant change of subject, as in mania or systematic folly (idiots and microcephalics), with repetition of the final syllable. These are symptoms which point to an unfavorable prognosis.

Cases of the second class are those in which the speech troubles are not the direct consequence of idiocy, the expression of the morbid arrest of the conceptual life, but rather a complication. We find at first mechanical dyslalias, articulate troubles which are very widespread among idiots; this stammering serves as a transition between the two groups. Then come imperfections in the emission of certain syllables, imperfections which are equally inevitable in the development of normal speech. Sigmatism, rhotacism, and gammacism especially are found with other troubles in at least fifty per cent. of the backward. The troubles of articulation which manifest themselves at the moment of forming syllables or words appear under two aspects. In the first we see very pronounced stuttering during the formation of certain sounds, an impossibility of emitting the consonants distinctly, whence arises an indistinct articulation, difficult to define, which hinders or totally prevents the formation of syllables and words. When we try to make them speak we hear only a number of sounds which seem to be exactly alike, and so they remain incapable of speaking. These facts are always an evidence of profound psychical troubles. The second aspect has to do with a confusion of speech as soon as it becomes necessary to combine sounds; this speech is vague, confused, soft, characterized by a careless emission of the consonants and a forgetting of certain isolated syllables. Cases of this sort belong to moderate or light degrees of imbecility.

Wildermuth has rarely seen pure syllable-stumbling in idiots, and never stuttering. These results are absolutely in accord with my researches, and indeed I have always been struck with the rarity in idiots of these troubles of articulation, such as stuttering, angophrasia, echolalia, and the like, which are wont to be regarded as stigmata of degeneration. Where these trouble are encountered is in imbeciles who, as regards language, do not, however, present any notable peculiarities except in the smallness of their vocabulary. They are, we may add, usually chatterers, talking of everything simply for the pleasure of talking. We may also sometimes observe in them onomatomania together with various physical stigmata and temporary delirium, under the form of maniacal agitation, with excessive loquacity, recitation of songs and of poems previously learned; but they are ordinarily more incoherent in their acts than in their words.

Another form of language is *reading*, where the visual verbal images come into play. This is even more difficult to learn than is speaking. Naturally it is wholly impossible in incurable idiots; those of less marked degree may go as far as learning the letters and making out some detached syllables, but never reach the point of

being able really to read in the sense of understanding the printed words. They have no initiative and will repeat the letter pointed out to them but will not name it spontaneously. The educable idiot learns with very great difficulty to distinguish the letters, but he does learn it. Sometimes one has to work with him for several weeks over the same letter. Success in this is usually more quickly attained by making use of movable letters on wooden blocks. The idiot then looks upon the letter as a concrete object, something that has a real existence, and that is better adapted to his faculties. In this way he comes to recognize all the letters of the alphabet, but he recognizes in them only objects which he has learned to call by a certain name, and he has not seized the abstract notion of letter. Little by little we can make the idiot join certain letters and form easy syllables; he then acquires more rapidly the power of reading and of forming syllables which begin with a consonant. We often stumble against a peculiarity which leads the idiot to pronounce the consonant before the vowel in the middle of a word; once this difficulty is overcome the progress will be less slow. Even when we have succeeded in teaching the idiot to read, his reading will always be staccato, separating each syllable; his diction is sometimes monotonous, sometimes singsong, but never normal. It is only in about ten per cent. of these cases that we attain this measure of success; the others are able to recognize their letters, but they can never get beyond the stage of syllable formation, and cannot really read.

But after the idiot has learned to read, we have yet to see if he understands what he reads. In the school, where the printed ideas are adapted to the capacity of the reader, it is evident that he acquires an idea here and there; he understands fairly well the nouns and adjectives, but the verbs only with great difficulty. Most commonly, however, he understands nothing of what he reads, the process being a purely mechanical one. A rather curious thing is that, although he does not understand what he reads, he loves to read or rather to make a pretense of reading, when he has arrived at the age of ten or twelve years at the time when normal children also begin to have a taste for reading. He assumes the air of reading carefully any printed scraps of paper which he may pick up, and sometimes will even buy a newspaper in order to appear to read it.

The imbecile learns to read more quickly than the idiot, but the teacher has to contend especially with his want of attention. He never reaches the point of being able to read altogether correctly; sometimes he has angophrasia, or a drawling and repetition of certain vowel sounds, sometimes his diction is scanning; and even in those who have reached a comparatively high degree of intellectual de-

velopment we do not find that the reading is fluent and expressive. The books which imbeciles prefer are illustrated, and the pictures alone interest them. They look for these immediately, reading the description when printed below them, but not taking the trouble to look it up if it happen to be incorporated in the text. Their natural laziness is constantly cropping up to the surface.

Writing necessitates a number of limited and delicate movements of the arm and hand, which by reason of their precision require a rather long time to be learned, and to become no longer a fatiguing process but rather an automatic act, like dancing, walking, and the like. But we have seen that coördination of movements is something very difficult to obtain in the idiot, and sometimes even impossible. Idiots and imbeciles are always maladroit, at least that is the general rule. Consequently writing in them is even more defective than is reading.

The chirography is modified considerably with age, that is to say, with the character; while one hand resembles pretty closely another in young people and those who hardly know how to write, we see it gradually assume a special character, become strengthened, and acquire an independence, so that one handwriting is never identical with another even one of the same type. But this is not the case with the idiot, and since his character is very weak, and his sentiments only rudimentary, we must expect to find no more expression or firmness in his writing than in his reading.

We may distinguish agraphia and verbal blindness; some are unable to write, others cannot read what they have written. As a rule the idiot acquires with great difficulty the power of forming his letters. The first signs that he traces are those which suggest more or less closely the letter C, and he makes these over and over without looking at his model. He may sometimes be able to write, but merely reproduces the model that has no sense for him. There are some who write quite legibly but who are unable to form syllables. The idiot loves to imitate the printed character, and it is the letter O which he likes best to form and which he is also able to write best when it occurs alone; when it comes in the middle of a word, however, he has a tendency not to complete the upper part of the circle.

Berkhan examined the writing of sixty-four little girls affected with partial idiocy. In twenty of these the writing was of the same type; when the trouble was little marked one or another letter of the word was forgotten or replaced by another letter, but when the idiocy was more pronounced, the words were disfigured still more and in greater number, so that it was impossible to decipher any words except those that frequently recurred. This author established a par-

allel between this trouble of writing and the disturbance of speech which constitutes stammering. In both cases the signs of language are disfigured in the same way, but there is no real relation between the two. Even in idiots in whom both exist we find that they occur in different words.

Certain idiots acquire the ability to write, even legibly; their letters are regular and well formed, and they make few mistakes in copying. But we are always surprised to find that they are incapable of reading what they have written; sometimes, however, they are able to read the writing and may even spell correctly.

The idiot loves to write just as he does to read, and he amuses himself with scribbling just like little children imitating their elders. Séguin has made the peculiar observation that almost all idiots take the pencil first in the left hand, and when we place it in their right hand they always try to make the marks running from right to left on the page. This seems to be like an attempt at mirror-writing. Séguin compares it to the manner of writing of ancient people and even of orientals of the present day, who write thus from right to left.

Writing, therefore, in idiots is always defective if it is possible at all. Even in those cases in which it exists we can hardly say that it is real writing, since it is only a sort of copied drawing. Moroever, idiots can write only after a copy and never from dictation or spontaneously.

The imbecile learns to write rather rapidly, but he never forms his letters well. He can never bind himself down, like the idiot, to the imitation of a model, for that demands the exercise of too much attention, and he quickly loses sight of the copy. Thus when he has to write the same line several times on the page, there is a great difference between the first and the last; he repeats, while exaggerating, all the imperfections of his writing. Instead of making progress with time, we notice that there is rather a descending scale; the writing grows steadily more irregular, less careful, and less legible. The imbecile reads writing, as a rule, still worse than he does print.

I will repeat once more what I have several times said as to the difference between imbeciles and idiots. The latter, once having reached a certain point, can go no farther and remain stationary; the former, on the contrary, lose sometimes with a most discouraging rapidity all the progress that they had made up to a given time. When an imbecile is left to himself to write something, we often see him stop in the middle of his task and reproduce automatically the same word or the same sentence several times. He will also change the character of his handwriting several times in a single page. This changeableness in his chirography reflects faithfully the mobility of

the imbecile's character; regularity and symmetry are incompatible with imbecility.

There remain to be said a few words concerning *drawing*, which resembles writing in several particulars, but which also depends in great measure on the æsthetic sentiment, which, as we have seen, is only rudimentary in these patients. The idiot draws very slowly. He follows more or less closely his model, without adding anything to it but trying at the same time not to omit anything that is in it. He has no notion of perspective, a defect which he shares with young children and natives of the Far East, but he represents as well as he can the shadows in the model. He cannot draw from imagination without a model, or if he tries to do so, his marks are absolutely without form and have not the slightest resemblance to what he is attempting to represent.

In the case of an imbecile it is the same with drawing as we saw it was with writing, he does not like models to copy after; if he is forced to follow them he does so without expression and without proportion; his aim is to finish his task quickly, not to do it well. He is deterred by no apparent difficulties, and will attempt blithely to draw the most complicated things. He is not content with his model and tries to modify it, giving himself up to his imagination, and finally succeeds in producing a drawing which is irregular, fantastic, pretentious, and often absurd. Even to the most minute details we see this difference between the idiot and the imbecile; the first is a poor creature, arrested in his development, the second is a being, not only arrested in his development (although much less markedly), but also and especially twisted from the normal.

Intelligence.—We have here to study especially the degree of the intelligence in the idiot, which offers certain peculiarities. That of the imbecile, in a general psychological point of view, approaches that of the normal man except in certain points; it is an intelligence which is atrophied in certain relations, hypertrophied in others, and in others again regularly developed, but all without any definite order and without any special characteristics, unless we may regard as such the want of regularity, the instability, and the feeble general development. The intelligence in the idiot has been studied very superficially. Dagonet and Griesinger, who have done the most in this direction, are not explicit. The first of these authors takes as a measure of the intelligence the perfection of the senses and language, two things which have no relation whatever to each other. Griesinger recognizes four varieties of idiocy from an intellectual point of view: (1) one due to the impossibility of formulating the idea; (2) another due to the inability, through defect of attention, to retain an idea

once produced; (3) a third due to a sensorial incapacity to perceive the idea; (4) and finally one due to the impossibility of rising to the comprehension of an abstract idea. Nothing could be more correct, excepting perhaps the first category which assumes the existence of innate ideas. It seems to me that the first thing we should consider is sensorial imperfection, which prevents any conception from entering the mind. Next is the lack of attention, which, even in the case of perfection of the senses (which, however, does not exist), would equally prevent the entrance of the conception; this may, however, in a measure be overcome. Then comes the impossibility of generalization, and finally that of abstraction.

The intelligence, properly speaking, comprises four operations which we shall consider in order, namely, acquisition of ideas, preservation of ideas, association of ideas, and production of ideas.

We acquire concrete notions by means of the senses before the apparition of language; the latter permits us to rise to abstract ideas. Now we have seen that sensation, which is scarcely existent in the lowest idiots, begins with attention, and may attain the normal in imbeciles. These latter are, indeed, much more apt than idiots in coming to know the different objects. In order to know an object well, there must be brought into play different faculties, such as comparison, reason, and judgment; the person must seize upon its resemblances and differences with other objects. Now idiots may see and not understand what they see. The processes of the acquisition of ideas are the same as in normal children, namely, by means of the senses and of language. But that which differs is the relative importance of the two, the long duration of the consecutive employment of these two means, for the normal child employs them very rapidly and simultaneously. In the idiot we must address ourselves to that which is the most developed in order to gain the greatest possible advantage, that is to say, to the senses; and it is to these that we must address ourselves almost exclusively up to the age of ten years or even later. Language is but an insufficient auxiliary. There are idiots who know how to employ tools and who work tolerably well, but who would be incapable of telling the names of the instruments or of saying what was the object of their labor.

Concrete notions being furnished by the senses, it is evidently those which the idiot may acquire with the least difficulty. The forms which strike him the most are the square and especially the circle. He seizes well upon the idea of the incompatibility of these two forms, and for him the expression "square circle" would signify impossibility. As soon as the idiot is capable of a little attention he seems to experience a true enjoyment in the sight of colors. It is red

which attracts him the most, and girls especially love to deck themselves out in scraps of scarlet cloth. Séguin remarked that most girls and a certain number of impressionable boys are more struck by differences in color than by those in form, and can distinguish objects better by their color than by their form. The idiot has a notion of surface, for he loves to pass his hand back and forth over a polished surface. He knows therefore how to distinguish between roughness and smoothness.

The profound idiot cannot appreciate distance, and this is perhaps one of the reasons why he always remains fixed in one place. He moves very slowly, as if through fear of knocking against something, and when he is walking he stops well in advance of meeting any obstacle in his way. We have seen, furthermore, that idiots are generally hypermetropic, a fact which might explain in a measure this peculiarity.

We shall study later the question of general and abstract ideas at the same time with comparison, generalization, reasoning, and judgment.

Let us see now what rôle *imitation* plays in the acquisition of ideas by the idiot. We know how much we make use of it in the education of the normal child, but unfortunately we cannot employ it to the same extent in the idiot. We may bring into play his imitative powers in order to make him do a certain definite task or perform a certain more or less complicated act, the object of which he often does not understand. In this way we create in him an association of adapted movements analogous to those of walking, for example, and which are reproduced in a sort of reflex manner without any participation of the intelligence. That this is so is seen when we seek to change the manner of acting in order to attain a slightly different object, for then we have to teach the idiot over again from the very beginning to perform the new exercise. The exercise of imitation, therefore, has not the result of developing the intelligence, properly speaking, in the idiot, but rather of training his motor activity and of regulating it in a determinate and invariable manner. It is not an idea which we give him, but rather a mechanism which we create in him.

This is not the same in the case of the imbecile. He imitates what is done before him, roughly and usually only approximately, but still he imitates; but if we seek to teach him another task he readily abandons the first. We may believe we have succeeded in teaching him something new and in showing him different ways of acting according to varying circumstances, but unfortunately one idea excludes the preceding, and when we want him to do something to

which he was formerly accustomed we find he has forgotten and we must teach him over again. Thus to a certain extent it is much easier to get good work out of an idiot, provided we make him always do the same thing, than from an imbecile who never perfects himself, whose attention tires quickly, and to whom we must show the same thing over and over after every interval of respite.

We must not think, however, that because intelligence does not manifest itself continually there exists therefore no intellectual impression in the brain. We see an excitation produced by pain, for example, and an acute disease may determine a psychical activity of which we had had no suspicion up to that time. That proves to us that in certain idiots, under ordinary conditions, there exists a greater intellectual receptivity than is apparent, and that there may be traces of impressions in the brain even when there is no external evidence of them.

In order that notions and ideas which have once made an impression on the brain should be profitable, it is necessary that they remain there and that they may be recalled on occasion. It is the *memory* which is charged with this rôle. We may distinguish three sorts of memory, namely, hereditary, organic, and acquired. Hereditary memory may explain certain singular aptitudes which we meet with occasionally in idiots and which contrast strangely with the lack of intelligence of the subject in other respects. Numerous instances of this sort have been recorded. This form of memory may also explain why certain idiots are capable of doing certain things of rather complex character and which demand the exercise of several faculties, such, for example, as playing at cards. This whole question of hereditary memory is, however, very obscure.

Organic memory, that is to say, the unconscious memory of movements which are associated or combined with a definite object in view, such as walking, to instance one of the most simple examples, is sometimes entirely absent in the idiot. This absence may depend upon the state of the nervous centres or upon that of the attention.

The attention is still more necessary for acquired memory than it is for organic. Without attention there is no memory, not that attention is necessary for the reproduction of impressions received upon the cortex, but because it is indispensable for their fixation there. Emotion plays an important part in fixing images in the brain. In the idiot, as we have seen, the attention is developed only tardily, and sometimes we are unable to attract it by any external object; we are then obliged to occupy ourselves with the development and education of the organs. The automatic hereditary movements are those which the idiot learns the most readily. Once these movements are

learned, the idiot may come, go, and move about without it being possible to fix his attention on anything intellectual. We must then educate his senses while employing all the means at our disposal to attract in any way his attention; we may then be surprised to see that it is only from this moment that a determinate impression becomes fixed in his brain, and by the end of a certain time we notice that at the sight of some object the idiot recollects having seen it before. The impression is then not only fixed but may be recalled, and it is this which constitutes true memory. It is only after a while that a word is associated with an object in such a way as to recall by itself alone the image of this object. These different phases of memory, which unroll themselves rapidly in the normal child, are very slow in their succession in the idiot and sometimes never develop completely, the later stages remaining always absent.

At first we see memory in a latent condition, developing only under the influence of a strong excitation. This is the first phase, there is conservation of the image but not reproduction of it. In a higher degree we see, alongside of this latent memory, the recall of the image under the impression of the real object. We note this in the case of objects which please, such as food, or sometimes even in the memory of places. All these phenomena of the memory are very simple and do not presuppose the exercise of more than a very small number of nervous centres; they do not imply language, and are merely those which may be met with equally in animals.

When language exists, a new field opens out to the memory—the recall of things through the intermediary of the senses in hearing the words which represent them, and the introduction of ideas to the mind by language. These two degrees may be observed independently in the idiot. We have seen, in studying the question of language, that there are idiots who understand nearly all that is said to them without being able to speak, just as we find in normal children at a certain age. In such a case it is necessary only to say a simple word, the name of some object which the idiot knows well, in order to direct his attention to this object if it happen to be near him, or to awaken the idea of it. This recall of the image by the word is a very simple act of the memory, but is nevertheless of great utility in education. We employ it in the case of educable animals, the dog for example, in which the word "whip" may awaken the idea of correction. Many idiots go no further than this.

The association of ideas is, however, an equally necessary condition of memory, and this, as we shall see later, is quite weak in idiots and imbeciles.

We must also be able to recall the emotions, the sentiments, and

the ideas which have previously been developed. But we have seen how very attenuated the sentiments and the emotions are in idiots and imbeciles. The memory of the emotions is therefore still more feeble, for in order to awaken them we can only make use of language, and the intellectual development must therefore be tolerably far advanced. Among the strongest emotions which the idiot can experience, fear and pleasure occupy the first rank. But the phenomena are very fugitive, and the impression does not last. The memory of a threat or a promise is more durable in the imbecile, but even here it is effaced with considerable rapidity. The affective memory is thus but little developed in these creatures in proportion as their affectivity is rudimentary or perverted. The weakness of this power of recalling the emotions explains the indefiniteness of character of these subjects.

Instances have been put on record of extraordinary memory in idiots and imbeciles, but these exceptions prove absolutely nothing. As a very general rule, memory is imperfect in both the idiot and the imbecile. There is a difficulty in the preservation of the image, but especially in its reproduction; it is sluggish, like the attention. There is a difference between the memory of the idiot and that of the imbecile in that in the former it is more frequently combined with comprehension. The memory in imbeciles is sometimes apparently greatly developed, but if we observe closely we shall see that he recites anything always in the order in which he has learned it, and that the slightest interruption in the recital cuts it short, for the imbecile does not understand what he is saying. His memory is then not a proof of intelligence, although it may appear to be so the first time we see it exercised; if we examine into it we shall see that the imbecile uses only stereotyped terms or phrases, and speaks, as it were, automatically. Such a memory cannot be utilized to any extent, for even if the imbecile learns quickly he forgets with equal rapidity. Thus idiots may remain very long at the same stage of development, while imbeciles, if left to themselves ever so little, forget everything with extreme rapidity. The education of curable idiots is therefore, in certain respects, more profitable than that of imbeciles.

After the materials have been acquired by the senses and language, and preserved and reproduced by the memory, reasoning and judgment must intervene before the subject can perform an act of intelligence. These two mental acts necessitate a preliminary operation, to wit, *comparison*, by means of which one may rise from the concrete idea to the abstract or general idea. One must discern the resemblances and differences between objects in order to be able to

judge of them. In idiots it is evidently the appreciation of resemblances which predominates. The simple idiot may compare, but he seizes only gross and superficial relations. Color and form, especially color, are the things that strike him the most. It is easy to understand into what errors of judgment he may be led if he takes the latter solely as his standard of comparison, since color is an altogether accessory attribute of objects. Idiots confound persons very readily, yet they sometimes first learn to distinguish these. As regards the appreciation of differences, it is the sense of sight which gives to idiots the principal indications. It is very difficult to make them learn to discriminate between objects by means of other less perfect senses, such as taste and smell, especially the latter, and even when they are able to differentiate in this direction they always do so vaguely.

Profound incurable idiots do not appear to grasp the idea of any differences between objects, and sometimes not even between persons. Discernment, which is the real basis of our intellectual conceptions, is always very defective in idiots, even those of quite mild grade.

In imbeciles also we see a greater aptitude to appreciate resemblances than differences. Thus they sometimes seize readily upon anything that is grotesque in a person and may express it in comparisons which are occasionally quite droll and which make them appear to be more intelligent than they really are; more often, however, these comparisons are absurd and usually trivial or vulgar.

Are idiots capable of *induction*, of generalizations? To call things by a general term because one does not appreciate the differences in them, and to do the same because one sees the resemblances are by no means the same. Idiots employ general terms, just as do savages, because they seize only upon the relations of resemblance, and not in consequence of an induction. In order to be able to form inductions and generalizations one must grasp the differences as well as the resemblances, and if the latter alone are seen the induction is usually false. Idiots are, however, capable of simple generalizations just as they are of simple comparisons. It is only very slowly that even simple generalizations are produced, but once arrived at they are generally well grounded. In imbeciles, on the contrary, the generalizations are usually hasty; seizing upon resemblances between objects more rapidly than do idiots, they arrive at conclusions which are as a rule even more erroneous than those of idiots. One experience will usually suffice to lead them to conclude it will always be the same; thus they often do absurd things with the best intention in the world. This is a striking trait in their character, and it is that which gives them the overweening confidence in themselves, the

fatuity which is so strongly developed in them. In consequence of this trait we must be very careful not to allow an imbecile to take the initiative in anything, for it will very rarely be crowned with success.

In profound idiots the abstract idea does not exist. "In profound idiots," says Griesinger, "the impressions of the senses produce very few ideas; the latter are so fleeting and superficial that they are promptly effaced without giving rise to any work of abstraction, so that these individuals have scarcely any but material, isolated ideas determined by sensorial impressions." In curable idiots, on the other hand, even those who cannot talk, abstract ideas certainly exist; they are very vague, no doubt, but we are not discussing here a question of degree.

Calculation is very difficult for all idiots and impossible for the incurable ones. The most intelligent idiots can scarcely count as well as a child of ten years, and if they are interrupted in the midst of their count and made to skip a few numbers they are unable to continue. Séguin advises the suppression of the abstract as far as possible in the teaching of arithmetic. Here also, as in reading, we must begin with the concrete idea, and a given idiot who might not be able to count up to ten would be able to do so by counting on his fingers or by means of marbles. The same is true of the most simple calculations, addition or subtraction, which they may do by means of tangible objects, but which they could not do on a slate or still less mentally. We usually succeed quite well in getting them to understand addition, but it is often very difficult to teach them what is subtraction; certain of them can never learn to understand it, even those who may be fairly well developed in other respects. The principle of multiplication is not understood, and in the great majority of cases division is impossible. As to problems, idiots and imbeciles are equally incapable of comprehending them at all. In imbeciles the memory acts almost alone and as soon as we make an appeal to the reasoning faculty we obtain negative results. We may affirm that calculation and numbers in general, so far as they are abstractions, are not understood by imbeciles and still less by idiots.

Notions of Time.—Idiots, like children, have scarcely any notion of past time and even less of future time. Without any aim in their existence, indifferent to what they are made to do, and having but a very imperfect memory, they hardly are able to say what the season of the year is, what month it is, or even what day. They resemble in that respect dements and certain of the insane with stupor for whom sensations and events succeed each other without the patients having the least idea of the temporal relation between them.

But have they any appreciation of the present time which is pass-

ing; do they take account of the time which they expend in doing a certain thing? In this respect they are like animals who recognize by certain sensations that the time has come to satisfy their wants; as, for example, feeding time. But that cannot be regarded, properly speaking, as an abstract idea, for it is not by an appreciation of the time which has passed that they divine the time that now is, but they divine it rather by the desire which they feel.

Simple idiots judge imperfectly of *distance* and do not well appreciate the size of objects. In this respect they resemble children very closely, but differ from them in that proportionally to their age they are far behind normal children; and sometimes they never arrive at a notion of absolute extension, and still less of immensity.

We hardly ever find *fixed ideas* in idiots or imbeciles; all their ideas are too feeble and too unstable. There may be impulses, but they are not under the domination of fixed ideas; I myself have never seen the latter in idiots. In the imbeciles we may see dangerous impulses to theft, homicide, or incendiarism, but we hardly ever see the fixed idea with its ordinary attributes of consciousness and anxiety. We see at most tenacious ideas, among them ideas of flight, for the realization of which they may succeed in deceiving the most watchful attention, whether they are in their own homes or in asylums. These flights may be of two kinds: they take place without any aim in view and without reflection, an open door is found and the patient goes out by chance; in other cases the running away is calculated and premeditated and effected with all the precautions that can be imagined, the aim being usually to give free vent to their desires far from observation and away from all authority. Flights of the first kind are most common among idiots, those of the second class among imbeciles.

Let us now see in what manner the *association of ideas* takes place in idiots. We know that normally it is effected in three different ways, namely, by resemblance, by contrast, and by contiguity. In profound idiocy there are associations only of very crude ideas, having relation chiefly to alimentation; ideas are awakened in these subjects chiefly by sensations and wants. It is generally by resemblance, more rarely by contiguity, and never by contrast that the association of ideas occurs in them. Association by contrast is quite rare also in normal children. Idiots associate similar sounds just as do young children, in whom the love for these sounds expresses itself first by an absurd and tiresome repetition and later by pleasure in music and rime. Griesinger attributes, and justly, to the defect of association in idiots their indifference and nonchalance. "The milder the degree of idiocy," he says, "the greater is the number of

ideas, and the more also is the individual capable of judgment and determination; even yet, however, he does not possess that promptitude of association and combination of ideas which will permit of any abstract work without effort and without fatigue if it is at all prolonged." The mind acts very slowly and the impressions must be very strong. From this comes the indifference of idiots for many things in the external world, their nonchalance, and their ineradicable carelessness.

The special object of the association of ideas is to produce an exercise of reason of which the end will be a general or particular *judgment*. But judgment is not always the result of reasoning. In the presence of the evidence there may be an immediate judgment which is merely the statement of the impression produced in the mind by the thing considered. Justice, promptitude, and firmness are all qualities of judgment. These qualities result from the force of attention which enables us to grasp all the conditions of the judgment to be formulated. But in idiots attention and the rapidity and distinctness of the impression are especially weakened, as we have already seen, and we need not therefore be surprised to find in them a most faulty judgment. As regards justice, idiots judge very incorrectly; their attention does not permit them to grasp any but the grossest of the qualities, and as they are capable of only the simplest associations, their judgments are absolutely erroneous. All the illusions of the senses, which are nothing else but illusions of the mind, which they do not know how to prove or correct, give occasion to false judgments. Furthermore, the very qualities which ought to determine the judgment make but faint impression on their mind. In order to get them to come to any conclusion whatever we are obliged first of all to fix their attention, whence results a very considerable delay in the judgment. The case is no better as regards the firmness of the judgment. They show themselves so indifferent to what is asked of them, unless it is of immediate interest to them, that the least doubt which we may express serves to destroy their conviction at once.

Just as we see in the case of infants, the first judgment generally suffices for them, unless, by distracting their attention, we force them to reverse it by some new judgment. That which denotes a great progress in judgment is the manner in which it is expressed, that is to say, the clearness and precision of language; but we have seen above how little there is to hope for of serious progress in this direction.

There are some idiots who are very set in their opinions, but we must not confound this with firmness. They sometimes display an absurd obstinacy, which is a characteristic of individuals of very

limited ideas, in possession of few images and of but a small variety of associations. We may add, furthermore, that in order to affirm with great obstinacy one must have a rather wide collection of ideas without a sufficient number of associations to be able to choose that which is the only correct one. Now idiots, having too few ideas, are in general not very obstinate, while imbeciles are so much more often. Dagonet certainly exaggerates when he says that imbeciles have no judgment or an erroneous judgment and that the judgments to which they give expression are never their own. They are in this relation like all the unstable: a judgment expressed before them strikes their mind and remains there in a latent condition; then some day they utter it and we are surprised to hear such a thing come from their lips. But although many of their judgments may be thus suggested, this is not the case with the greater number. Especially characteristic of imbeciles are the illusions which they cherish concerning their intellectual faculties, which often carry them to an excess of fatuity, however little we may contribute to it by pretending to believe in them or to admire them. In order to obtain from them a sound judgment we must continually correct their faulty reasoning; and in any case we obtain only the most simple judgments from them, that is to say, a mere expression of their perceptions. The doubt which suspends action is rarely theirs, and their acts often assume a slightly impulsive form in consequence of the lack of reflection between the judgment concerning the act to be performed and the performance of the act itself. In this respect automatism of acts is more developed in idiots than in imbeciles, for it is in proportion to their diminished intelligence.

As regards *reasoning*, properly so called, under its syllogistic form, they do not know how to formulate it, and even the least affected imbeciles do not know how to draw a conclusion. In a psychological sense the conclusion of a logical reasoning process is analogous to a perception, the only difference being that perception is based on sensations while reasoning is based on precepts. The latter being a synthesis of sensations and images, we see that in the end all reasoning has perception as its basis. Now we know how weak or false this is in the subjects of our study. In idiots, the images being very weak, the perceptive reasoning is itself weak; sometimes it is not produced at all, if we may judge by the only means in our power for recognizing it, namely, the act which it provokes. In the imbecile, on the other hand, there is a greater number of images, but they are usually false in consequence of a badly functioning perceptive centre. Associations are made in him by contiguity, and his reasoning has therefore a much greater chance of being also false; thus two sensa-

tions which have given birth to two contiguous images may have no logical connection with each other, but the patient does not see that there is no relation between them. That which strikes us most therefore in their conceptions is the want of connection, the unexpectedness in their observations. The idiot, on the contrary, associates more simply by resemblance, the consecutive sensations having no connection with each other, since he sees only in the present moment in consequence of his want of attention and his feebleness of memory.

The only reasoning which exists in these beings is perceptive reasoning. Logical reasoning is absent in idiots and extremely rudimentary in imbeciles, in whom furthermore it is often erroneous and exists under the form of sophism rather than of syllogism.

Following the discussion on reasoning would naturally come that on *delirium*. This exists under very different forms in idiots and imbeciles. In the former delirium is extremely rare, exceptional indeed, and when it does occur it is exclusively under the impulsive form, without apparent motive and unprovoked; forms of this sort are cleptomania, pyromania, and especially clastomania. The delirium of idiots is especially one of acts. In imbeciles we also see these attacks of maniacal excitement, these impulses to kill, to steal, to burn, or to break; but there is another special form, a delirium of ideas this time, occurring under the influence of contact with another sufferer of the same kind, or under the form of polymorphous delirium. These subjects never present a systematized delirium, one logical in appearance. The incoherence, the absurdity, the mobility of the delirious ideas give to these forms sometimes a resemblance to the delirium of general paralysis, for which it may even occasionally be mistaken, especially when the ideas are those of grandeur.

The fourth manifestation of intelligence is the *production of ideas*, that is to say, a new combination of association of percepts. The imagination may reproduce the sensations and ideas in a new order; it presupposes, therefore, a sufficient number of percepts to allow of their being associated in diverse ways other than the usual associations which have been determined by teaching and example. The sensitive and reproductive imagination is that which is encountered most frequently in idiots, and the creative imagination in the domain of ideas is that which we see especially in imbeciles. The productive and creative imagination is very rudimentary in idiots. They are capable of copying or imitating in a certain measure, but they are not capable of producing without the intervention of the senses. In a word, they have a receptive, but in no sense a creative intelligence.

It is very difficult to determine whether they have an imagination

which is more developed for certain senses than for others. However, in the case of those who are blind and who yet can do certain work, it is allowable to suppose that they represent to themselves the things that they touch. As for any creative imagination, they are incapable of making a narration or of composing any sketch however crude. This defect of the imagination is, in my opinion, one of the best explanations of the fact that idiots are not, as a rule, liars. Certain idiots do, indeed, love the marvellous and compose by themselves fantastic tales, but this love of the fantastic is uncommon in them, and the only ones who ever can compose these tales are those who have received a most careful education. The idiot is also extremely credulous for the reason that he is unable to distinguish the possible from the impossible.

In imbeciles we observe most commonly an ill-regulated imagination, as we might have supposed from the love which they have for grotesque comparisons. This turn of the mind may sometimes be mistaken for intelligence. We have seen also that they are all liars, more or less, not contenting themselves with a simple denial of facts, but manufacturing stories out of whole cloth, and sometimes even to their own disadvantage. The tendency to see the grotesque side of things and persons leads them to ridicule others, and in their derision they are always malicious.

Dreams being related to the imagination, we do not find them in idiots, but we do find them, on the other hand, quite frequently in imbeciles, who often relate the fantastic dreams which they say they have had. It must be remarked, however, that we have no means of knowing whether the dreams really occurred, since we are dealing with such unconscionable liars.

It is worthy of remark that the imagination of imbeciles, the only faculty which may sometimes reach in them a considerable development, is never exercised on anything that can be useful to their fellows, make their work more perfect, or advance them morally. It is always employed in the direction of satisfying their passions, their vanity, their desires, and their evil instincts.

The Will.—Séguin believed that a lesion of the will was the fundamental fact in idiocy. In reading his works we gather the impression that he regarded this diminution of the will as the cause itself of idiocy and that the lesions of the other modes of psychical activity were only secondary, the lesion of the will being in some sort independent. I have already, in speaking of the classification of idiocy, endeavored to show the falsity of this view, and how we cannot conceive of a perfect will in an incompletely developed brain or an absence of the will as complete as it is in idiocy in a perfectly normal

brain. In profound idiocy, says Griesinger, the efforts and the determinations are always indistinctive; they are provoked especially by the desire of food; most commonly they have the character of reflex actions of which the individual is scarcely conscious. Certain simple ideas may also excite efforts and movements. In many idiots of the lowest degree the only thing which appears to excite their will a little is the desire of eating. Profound idiots express this only by an unrest and grumblings. Those whose degeneracy is less profound may move their lips and hands, or even cry for food.

In mild degrees of idiocy the main characteristics are the inconstancy, the obtuseness of sentiment, and the weakness of the will. This feebleness of will shows itself in very different degrees. In the lowest degree the will is wholly absent; there is no trace of voluntary movement even in the process of alimentation; the movements which are produced are purely reflex, and the idiot is reduced to the condition of a purely spinal creature, like the new-born child. In the next higher degree more or less incoördinate, but nevertheless voluntary, movements occur when food is shown to the idiot; when he sees it, the automatic movements, the tics, cease momentarily sometimes. We may say, apropos of this, that in these creatures the automatic movements, under the form of tics of various kinds, are in inverse ratio to their voluntary motility. In a still higher degree the will is shown by more complex movements, which may become secondarily automatic in their nature; such is walking, for instance. Beyond this there is another very characteristic voluntary manifestation—a phenomenon of arrest, namely, the voluntary control of the sphincters. The possibility of retaining the dejecta is consecutive to the possibility of walking in idiots, and when we see them retrograding we observe that relaxation of the sphincters precedes the loss of the ability to walk. This defect in the action of the sphincters is often incurable, and it then is an indication that the individual is incapable of education. On the other hand, when we have succeeded in overcoming this by appropriate measures, we may hope to be able to develop the attention and the will sufficiently to render education possible.

The highest manifestation of the will is in voluntary attention. We have already studied the attention sufficiently and need not return to it.

In the study of the will, in addition to its general degree of development we have various other points to consider, such as the physical, intellectual, and moral motives which determine the volitions, and the manner in which choice and determination are effected. We shall also examine the susceptibility to suggestion, conscience,

and personality, and as a consequence the responsibility of idiots and imbeciles in a moral and a civil point of view.

That which most actively excites movements in the child is first desire, that is to say, needs, then pleasure and pain, that is to say, sentiments, and finally intellectual phenomena properly so called. We observe the same order of evolution in the idiot, except that he is arrested on the way at a more or less advanced stage.

In the lowest idiots we see no trace of volition; the most natural wants, the primary instincts of human nature seem not to exist. It is the desire for food which appears first, as it does in infants, and sometimes it exists alone during the idiot's entire life. It is impossible to discover any emotion of pleasure or of fear in these cases. In order that affective motives may act attention must be possible, for memory and association of ideas develop through it; when it exists we may determine its action by an imperative gesture or a gentle and encouraging intonation.

The power of arrest of the will develops later than that of its action, just as we see in normal children, but it is never so well developed. The consequence of this is that impulse is the most frequent form of activity in idiots and even in imbeciles, but there is an enormous difference between the two in this respect. In the idiot, the excitation necessary to determine a movement having always to be very strong, there is usually no occasion for putting into play the power of arrest; intervention is unnecessary unless the excitation determines the action. In the idiot it is not the power of arrest which prevents the act from being performed, it is rather the absence of sufficient active volition. There is therefore no equilibrium between the two powers; there is insufficiency of one and absence of the other. This is not the case in the imbecile. In him there is an active impulse, a rapid reaction, often false, however, in consequence of the vicious association which we have seen exists in him. The power of arrest is only very feeble, and, the excitation being sufficient to produce the act, it takes place under the form of a veritable reflex without anything intervening to prevent it.

I do not, of course, refer here to the unconscious impulsions, which incite idiots to break, burn, and kill without any motive and without understanding what they are doing, but of conscious impulsions which they are unable to resist. It is in imbeciles especially that we frequently encounter the latter. They commit crimes in order to satisfy an inclination because they experience pleasure in this satisfaction. Although equally dangerous, idiots and imbeciles are so for different reasons; we shall have occasion to refer to this again in its medico-legal relations. It is to the imbecile that the following

passage from Ribot applies: "The intellectual adaptation is very weak, at least very unstable; reasonable motives are powerless to act or to hinder; the impulses of a lower order gain all that the impulses of a higher order lose. The will, that is to say, the reasonable activity, disappears, and the individual falls back under the dominion of the instincts."

The sentiments capable of determining volition are different in idiots and imbeciles. With idiots we often obtain more by gentleness, by the confidence which we inspire in them, than by any other means; and just in proportion as we can effect much with them by these procedures, just so impossible is it to guide and educate them when we act roughly with them. With the majority of imbeciles the exact contrary holds, and it is by a display of force, by intimidation, that we succeed in making them work; as soon as we relax our severity a little the rudeness and the undiscipline reappear.

Self-love, another motive power, is but little developed in idiots, but very strong in imbeciles; by stimulating it we can often make the latter do things which they would never have done otherwise. It is worthy of remark also that we can obtain much more by encouraging this tendency than by opposing it. This is true of all tendencies: we can always accomplish more by satisfying them than by their repression.

The affective sentiments, properly speaking, are likewise motives of different power in these two classes of patients. In idiots the affections, when they are capable of being aroused, are more marked than in imbeciles. The pain which idiots believe they have given to persons who have the care of them causes them much more grief than imbeciles would feel under the same circumstances. The latter may, indeed, be very sorry at first, but they quickly forget that they have caused pain, either because they are not conscious of it any longer, or being conscious they do not care.

The defective sexual development in most idiots leads to an absence of sexual emotion and of the acts which flow from it. In the imbecile, on the other hand, the genital functions are often greatly developed, and sexual emotion is very strong as well as perverted and impulsive. Thus it is among individuals of this class that we find those who are guilty of most of the monstrous crimes and assaults accomplished with an extraordinary cynicism, accompanied by a refinement of aimless cruelty and brutality—acts of rape followed by mutilation of the victim, and violations of very young children, old women, or cadavers. In this respect the imbecile is much more dangerous than the idiot.

We have now to consider the intellectual motives of action, that is

to say, acts accomplished under the influence of judgment or reason. In studying the latter we have seen how rudimentary it is in the idiot. Reasoning in the imbecile being often faulty the acts determined by it could scarcely be anything but inopportune in consequence. Furthermore it is not in consequence of reasoning that they act most frequently, but rather from judgment alone. But we have seen how rapid is their motor reflex. They jump at a conclusion from the first impression that strikes them, whether or not it corresponds to the fundamental quality of the object considered. The act follows immediately upon the formation of the judgment, for nothing can overthrow it, so firmly is it established in the mind as absolute.

How are *choice* and *determination* made? To wish is to choose in order to act, Ribot has said. Three cases may present themselves: (1) the impulse is wanting and no tendency to action is produced (aboulia); (2) a too rapid and too intense impulse hinders choice; (3) the will exists only in a vacillating form, unstable and inefficacious. These three cases are encountered in all idiots and imbeciles. In idiots we find especially the first and second; in imbeciles often the second and especially the third. These are, of course, only general indications, and in practice we must make more subtle distinctions. The idiot manifests a great hesitation in choosing between two things which are offered to him; it is possible that his inaction arises, in part at least, from the impossibility of determining between two acts to be performed. The imbecile under the same circumstances scarcely hesitates at all. He seizes one of the objects, either at haphazard or through some motive that especially flatters him at the moment, without reasoning on the advantages that he might derive immediately or remotely from his choice. If two objects are presented to him in succession, it is the first that he chooses almost invariably; then when the second is offered to him his choice at once rests upon it. It is always the impression of the moment that he obeys, but often a single word will make him change his mind. This indecision is a good example of the mental instability which is so characteristic of the imbecile.

The imbecile has also an extreme susceptibility to *suggestion*. In idiots, on the other hand, in whom the will is very weak and the motor determinations are produced with difficulty, suggestibility is little marked and we might almost say it does not exist at all. Their indifference in action is another cause of their refractoriness to suggestion. But, as we have just said, the tendency in imbeciles is quite the contrary. They are extremely susceptible to suggestion, but its influence is of short duration. This facility with which they yield themselves to suggestion may be something to be feared in

them, and we must lay great stress upon it in a medico-legal point of view. This ready suggestibility bears witness to the slight degree of tenacity and the slight intensity of old impressions and to the weakness of association of ideas in these beings. The slightest material incitation is sufficient to efface the tendency which we may have struggled for a long period of time to develop in them. One result of this is that the imbecile yields very readily to moral contagion.

In what measure idiots have a consciousness of their acts and of their *personality*, and what is in them the conscious and what the unconscious part are questions which it is very difficult to answer. In absolute idiots, pure vegetative automata, we may almost positively assert that there is no consciousness, and still less personality. In the case of higher, educable idiots we are still able to appreciate but very imperfectly the condition of their consciousness, for the defect in their power of speech prevents us from knowing whether they recognize in themselves what they feel and what they wish. There is also in them an enormous degree of automatism which makes their consciousness very weak if it does not swallow it up completely. The absence of any notion of time and their lack of memory show also that for them life is made up rather of a series of successive moments, having but little relation one with the other, or of which they scarcely appreciate any relation other than that of a chain of circumstances, each marked off from the other. Under these conditions the sentiment of personality, which has as its *conditio sine qua non* a perception of the continuity of one's own existence, must of necessity be very rudimentary.

For a mental act to be a conscious one, for it to take place under the influence of some exterior or interior stimulus, it is necessary that this stimulus should have a certain intensity and a certain duration. But in the idiot a mental act, the reflex of the stimulus, is very slowly produced because of the weakness of the stimulus or rather of the great resistance of the brain. For this reason it is probable that most of the mental acts are unconscious, unless they are in response to a very strong stimulus employed for a long time. When they are accompanied by consciousness this must in every case be very weak.

The voluntary mutilations which they inflict upon themselves and the insensibility which they display in case of organic disease or during an operation, make us wonder whether they have any consciousness of being distinct from the external world. Another phenomenon which adds to our doubt is the stupor into which they fall quite frequently and sometimes periodically like woodchucks (hibernating idiots).

In the case of imbeciles we often find far less automatism and a

pretty clear notion of personality. Nevertheless we have seen that the mental reflex in them also is sometimes so rapid that the act which is its consequence becomes impulsive and, in consequence of this very rapidity, unconscious. They certainly have the sentiment of their personality, and in their delirium they often have ideas of grandeur—a fact which is in itself an evidence of an abnormal and hypertrophied sentiment of personality.

Let us consider now the question of *responsibility*. The preceding study will have in a measure rehabilitated the idiot and made it appear that he is less of a menace to society than is the imbecile. The idiot is before everything else a being incapable of action or of ideas; he is an incompletely developed individual. The imbecile, on the other hand, is an abnormally and irregularly developed being, capable of actions and of ideas which are necessarily for the most part abnormal like the brain which elaborates them. The idiot may present a certain degree of affection, but the imbecile is egoistic and often malicious even against those who have done him the most good. The idiot does better under the influence of gentle treatment, the imbecile under that of fear; the one is timid, the other arrogant; the one is capable of working, the other is incorrigibly lazy; the one is good, the other is bad. In one the reasoning powers are feeble, in the other they are false; in one the will is weak, in the other it is unstable. The idiot is scarcely at all susceptible to suggestion, the imbecile is markedly so.

From this brief *résumé* of the differences between these two classes of beings it follows very clearly that idiots are far less liable to be harmful than are imbeciles, but that the latter are as utterly useless to society as the former. Idiots, as we have said before, are extra-social, imbeciles are anti-social.

It goes without saying that neither in the one case nor in the other can there be any question of responsibility, especially in the moral order.

Idiots belong to the class of the impotent, the weak, and the infirm whom we have to protect and to support; imbeciles, at least the majority of them, belong to the class of harmful beings. Idiots must be supplied with the means of living; imbeciles, useless and dangerous creatures, must be kept out of the way of doing harm. As the latter, however, generally possess a physical constitution which renders them very capable of work and consequently of repaying in a degree the expense which they have caused society, we must not hesitate to employ any measures which may be capable of rooting out their bad tendencies and of developing whatever good ones they may happen to possess. They are not susceptible of the same education

as idiots, and they cannot be educated in the same way as idiots; the latter must be developed, the former corrected.

In addition to the moral responsibility, however, we have to consider the civil responsibility. If that were admitted we might unquestionably prevent the commission of many crimes against persons, and especially against property, committed by all these individuals whose absence of moral responsibility is far from being a guaranty against, and still less a compensation for the damage which they inflict upon society. The families of these creatures would, without doubt, be more regardful of the public safety if they knew that their lack of watchfulness would make them liable for the damages committed. This question, which regards imbeciles especially, concerns the insane also, against whom society is hardly protected at all except by the inconvenience which these cause to people about them. But these are points to be considered under the head of treatment.

We will conclude this section with a word of medico-legal interest concerning the civil capacity of idiots and imbeciles. As regards the first, their mental and intellectual condition is too evident to leave us any doubt as to their inability to manage their own affairs or to enjoy civil and political rights, to be called as witnesses or to serve on a jury. The same is true in the case of imbeciles of the lower degrees. But in the case of those of a sufficient degree of intelligence to be able to live in society the question is different, and unless they are judicially declared incapable of managing their own affairs or placed under the care of a guardian, it is evident that they must remain in the enjoyment of all their rights. It is sufficient to note this point and I need not stop to enter into details concerning the consequences which may result from it, which are, moreover, too apparent to require elucidation.

Diagnosis.

The diagnosis of idiocy is not difficult, as a rule, if we limit ourselves to a simple statement of the mental condition, but it becomes much more complex and sometimes even impossible if we attempt to make an anatomical diagnosis. The difficulty varies also according to the age of the person. We have seen by what signs we could recognize, or at least suspect idiocy in an infant, even a new-born child, and I shall not return to this point. In later childhood the diagnosis may rest between three things, namely, simple idiocy, imbecility, and deaf-mutism. Throughout this study I have endeavored to bring out the analogies and the differences between idiocy and imbecility, and I trust that I have proved that these two affections are fundamentally distinct from a nosographical point of view. Idiocy

depends upon a lesion, imbecility upon a defective functioning. The idiot is a kind of dement, the imbecile is unbalanced and mentally impotent. This distinction has not only a purely theoretical and diagnostic importance, but it is significant also as regards prognosis and treatment, which is the practical side of the question.

Deaf-mutism may sometimes be mistaken for idiocy, and furthermore it is not uncommon to find this condition associated with rather pronounced physical and mental degeneration. It is especially by the external appearance, the vivacity of movement, and the understanding that they may have of things, as well as by the development of the other functions, that we may arrive at a diagnosis.

There is the same difficulty in distinguishing between mild degrees of idiocy and simple intellectual backwardness; the latter is neither idiocy nor imbecility, but a very mild degree of arrest of cerebral development, occasioned most commonly by convulsions or eruptive fevers of nervous form, following which the child exhibits a certain degree of mental torpor and falls behind other children of the same age. As a rule no cerebral lesion can be discovered post mortem.

The anatomical diagnosis is very difficult and even impossible in the majority of cases. We must not confound with this the diagnosis of the form of the affection, which is very simple since it requires only the recognition of the predominant symptom. We may, however, make this anatomical diagnosis in certain cases, as, for example, when hydrocephalus exists. But if there is microcephalus we are often greatly embarrassed to determine whether there is unilateral or bilateral sclerosis, a simple arrest of development of the convolutions, or some malformation of the brain.

The diagnosis of cerebral sclerosis is possible in a certain number of cases, as, for example, when some local symptom, such as contracture, atrophy, or spasm of a member, exists. But it is extremely difficult to say whether the sclerosis is local or generalized, and also of what form it is. While atrophic sclerosis may be diagnosed in a certain number of cases, the recognition of the hypertrophic form is absolutely impossible, in my opinion at least, not only because it has no characteristic symptom, but also because, being such a rare condition, we are seldom led to think of it at all.

The diagnosis of meningitic idiocy is, with that of hydrocephalus, the most easy. It is to be made, indeed, from the previous history of the patient; we learn that he had at some given time repeated convulsions, meningitis, or some febrile affection accompanied by meningitic symptoms; that up to that time he had appeared to be a normal child, but that after that time his intelligence seemed to remain sta-

tionary or even to decline. We find also that these idiots generally have few stigmata of physical degeneration, at least few that are at all marked, which is an indication that their condition is an acquired one.

This question as to whether the idiocy is congenital or acquired is rather important as regards prognosis and treatment. And contrary to what we might suppose, congenital idiocy is not the more grave or less curable form.

The diagnosis of porencephaly or of cerebral malformations is absolutely impossible. That of myxœdematous idiocy is very easy as regards the nosographical diagnosis, but from the point of view of the cerebral pathology it is impossible in the majority of cases.

It is very unfortunate that we are unable to make the anatomical diagnosis in most cases of idiocy, because of the practical consequences that would follow if we knew more or less certainly what were the lesions in a given case. We should not toil, as we now do, to try to develop the power of articulate speech in an idiot whom we knew to be suffering from cerebral sclerosis, for we should take it for granted that his mutism proceeded from the presence of an area of sclerosis in the third left frontal convolution; we should not work with a patience worthy of better results to develop the power of voluntary movement in an idiot in whom the pyramidal bundle had been prevented from gaining the cortex in consequence of some intrauterine affection. It will probably be a long time before we shall be in position to make a more precise diagnosis of the anatomical condition than we can now from the symptoms present.

It is very necessary to refer again to the diagnosis of the form, repeating what we have already said in the section on pathological anatomy. It is, indeed, according to the shape of the cranium that we are able to distinguish hydrocephalus and microcephalus, and according to the external appearance and certain bodily peculiarities that we may make the diagnosis of myxœdematous idiocy.

It is possible to confound hydrocephalus with macrocephalus, but the latter is a rare condition. When we have to do with a young child the diagnosis is easy, for the open fontanelles are too characteristic to permit of confusion. But when the idiot is of a certain age, when the hydrocephalus is of small size, and when the sutures and fontanelles are completely obliterated, the diagnosis may be uncertain; in that case especially we must rely upon the previous history. But usually in macrocephalus the face participates in the exaggerated development of the skull, while in hydrocephalus there is a striking contrast between the cranium and the face; the latter is small and triangular in shape, and the features are delicate.

In cases of microcephalus also there may be a question whether a defective development of the brain is the cause of the smallness of the cranium or whether the cranium was prematurely thickened and ossified. In some cases we find skulls of idiots in which the bones are extremely thick. Here again we must consider the relative proportions of the face and of the cranium as a foundation for our diagnosis. In cases of microcephalus the face often presents an excessive development in comparison with the skull, the jaws and all the lower part of the face being excessive in size, giving to the physiognomy a brutal appearance, a sort of a simian aspect, but this is not so in cases of thickening of the cranial bones. These latter cases are furthermore so exceedingly rare that we may practically leave them out of consideration.

I shall not dwell further upon these different points of the anatomical or clinical diagnosis of idiocy. We have in the course of this study touched in more or less detail upon the chief external peculiarities of these patients, but it may nevertheless be useful to review rapidly three large and very characteristic types, namely, the microcephalic, the hydrocephalic, and myxœdematous idiots.

Microcephalic idiots have, as we have just seen, an animal physiognomy. The skull is narrow anteriorly without posterior projection, often acrocephalic; the ears are projecting, nose large, eyes small and close together, the lower jaw large (prognathism), all contributing to give the idiot his bestial appearance; the neck is usually bent a little forwards, the body is slightly inclined, and the arms are swinging. They have, in other words, a simian attitude, which naturally attracts the attention of observers, often leading them to make somewhat exaggerated comparisons.

The physiognomy is ordinarily mobile, sometimes even it has a humorous appearance by reason of a cynical and rather malicious smile which is observed there. Microcephalics are indeed often malicious and waggish, at the same time as brutal and wicked. Great chatterers, they talk without sequence, without measure, and without connection of ideas, but sometimes they make repartees which cause astonishment because of their subtlety. Their moods change frequently, a characteristic of epileptic idiots also. They are in general obstinate and defiant, vulgar, coarse, hateful, and bad.

The hydrocephalic form a striking contrast to the preceding, and they also vary greatly among themselves according to the degree of the hydrocephalus. Thus, for example, those in whom the hydrocephalus is considerable are unable to support the weight of the head and remain always lying down or sitting with the head resting against some support. The look is sad, the features are expressionless, and

the play of the physiognomy when present is remarkably slow. This apathy appears throughout their whole attitude and in all their movements. They are often somnolent, speaking little or not at all. In general, being neither affectionate nor malicious they have no attacks of rage and are not coarse like the microcephalic, and there is no appearance of bestiality in their countenance. They astonish and excite pity at the same time because of their apparent sadness and languor. We speak here, be it understood, only of hydrocephalics of a sufficient degree to be recognized as such at first sight and not of idiots who, while owing their mental condition to other more important lesions, may yet have a certain degree of hydrocephalus. The face appears small in relation to the cranium, the anterior and lateral projections of which stand out beyond the face. The eyes are level with the head, the eyebrows are scarcely marked, and the nose and mouth are small. This appearance is not due to a disproportion only, but there is actually a relative smallness of the face in the hydrocephalic. These creatures are ordinarily timid and gentle, but little impressionable or curious. They play but little, scarcely ever laugh, and appear indifferent to the stimuli of the different senses. We may say that they are the exact opposite of the microcephalic, not only in external appearance, but in their moral nature.

Myxœdematous idiots or cretinoids, who are less numerous than those belonging to the two preceding categories, have a still more characteristic aspect which gives to all of them a family resemblance which can never be mistaken when it has once been observed. They are of small stature, with short arms, large chest, projecting belly, large head, very short neck, widened by the pseudolipomatous enlargements which fill the supraclavicular depressions, coarse hair; with an eczematous eruption of the scalp, which is rebellious to treatment, with puffy eyelids, the palpebral fissure being sometimes reduced to a mere slit, large flat nose, puffy cheeks, thick lips, and half-open mouth; they are beardless and it is often difficult at first to distinguish males from females. The voice is harsh and nasal and the vocabulary is extremely limited. They all have the appearance of little men, and it is difficult to tell their age; when very young they look like little old men, and when twenty years old they resemble children. They often have an air of importance, of seriousness mingled with disdain, which goes well with their physiognomy. They hold themselves erect, straightening up all their little stature. This attitude has given to one of them (become classical since the memoir of Bourneville on this special disease) the surname of Pasha. Their appearance is, however, sometimes repellant when they are completely idiotic, as was this one. But some of them are capable of a

certain amount of intellectual development. These express in their countenance an air of satisfaction, which may in part be due to the fact that, being objects of curiosity, they come to regard themselves as quite important. They speak usually very badly or even not at all, and are always difficult to understand. They are affectionate, gentle, timid, modest, especially the girls. They retain for a long while their childish tastes, and we often see women of twenty years playing with dolls like girls of five. They are ordinarily polite, not restless nor noisy. They are often sullen, tearful, and do not like to be disturbed, and they detest any one who has the appearance of laughing at them, or who does not take them seriously and treat them as important persons. They have, in short, a very distinct and special character. The mental condition in acquired myxœdematous idiocy resembles in certain respects that of cretinoid idiots.

Course and Duration.

Idiocy may be congenital or acquired, and as I said at the beginning of this study, the first appears to be more common than the second. Many cases in which it seems to have begun some time after birth belong, nevertheless, to the first category. This is due to the fact that between birth and the time when the idiocy becomes evident, there have been certain nervous disturbances, especially convulsions, which are to be referred to the same cerebral lesions that cause the idiocy, and are not, as is sometimes supposed, the cause of this condition.

Sometimes idiocy is of sudden development, attaining its maximum at once. This is what happens in certain cases of congenital idiocy, due, for example, to malformation of the brain, to hemorrhage, softening, porencephaly, pseudoporencephaly, occurring during intrauterine life, or again to hydrocephalus. Again, it may appear suddenly following upon some grave affection of the nervous system, or some disease marked by cerebral symptoms. It must be remembered, however, that in these cases the patient was already predisposed to nervous affections, and if idiocy has supervened it is because the nervous elements were too young to resist the disease; this conforms to the definition which I have proposed of idiocy, to wit, that idiocy owes its principal character to the fact that the subjects are young. Occurring in adult life the affection which would cause idiocy in the young produces dementia or a more or less marked intellectual weakening. This is a fact which is too often forgotten in the study of idiots.

Sometimes, however, idiocy is developed gradually, and this is

the case especially in the acquired forms. The primary lesion, meningoencephalitis for example, continues to advance and produces as a consequence a more or less profound intellectual overthrow. The different forms of sclerosis also progress, but much less rapidly than meningoencephalitis. It is not uncommon to find tumors in the brain of an idiot, but that is only a complication and we always find other lesions sufficient to explain the idiocy. In these of cerebral or cerebellar tumors the progress of the idiocy is, we may readily understand, very variable and entirely subordinate to the growth of the tumor and to its nature.

The idiot attains quite rapidly his maximum of intellectual development. This then remains stationary, but usually only for a short time, and soon begins to retrograde. It would seem as though in the idiot the biological evolution is shortened and that he completes more rapidly than the normal individual his cycle of existence; there is no occasion for surprise in this, given what we have seen of his physical and organic condition. He is, indeed, in a condition of organic diminution which hardly is compatible with a prolonged existence, and thus the duration of life in idiots is much below the normal.

After arriving at a certain period of their development, at about the age of ten or twelve years, idiots cease to profit by the instruction that is given them. Their intelligence is closed to any new impression. If they have learned a trade they may continue to follow it tolerably well, but they rapidly lose the little power of reading and writing that they have acquired. The few general ideas with which we have at great labor imbued them disappear, and the time comes when not only all that they have acquired is lost, but when they retrograde still more and fall below the condition in which they were before the beginning of their education. This deterioration is both intellectual and physical, so that finally all manual labor is impossible and they become utterly helpless. After having been idiots they end by being dements.

This deterioration may sometimes follow a stationary period of longer or shorter duration, especially in cases due to cerebral malformation, porencephalus, microcephalus, or a mild degree of hydrocephalus, or sometimes immediately after the maximum of development has been reached. The disturbances in the handwriting, the changes observed in it from year to year, furnish one of the best criteria for measuring this deterioration, as they are also in general paralytics and dements. This change is also shown by the impossibility of continuing manual labor, by the hebetude that is noticeable in the patient's physiognomy, by his tendency to remain motionless,

his torpor, his diminished powers of speech, his negligence of himself, and finally his utter helplessness.

The duration of life in idiots is far below the normal. There are not many who live to the age of twenty years, and only a few hydrocephalics of mild degree, in whom the affection has been arrested early, and some microcephalics who exceed this limit. The immense majority of idiots, however, die between the ages of six and sixteen.

Complications and Termination.

The deterioration and death may be hastened by complications of various kinds. Thus tuberculosis is very frequent, and in consequence of their feeble organic resisting powers it is of quite rapid evolution. The same is true of bronchopneumonia, which develops in them very easily following measles or in consequence simply of their great tendency to catarrhal troubles. Many of these idiots hardly know how to breathe, and they also often take into their mouths all sorts of filth which may help not a little to infect them; thus pulmonary gangrene is a not very uncommon affection in these creatures. Various buccal disorders, such as aphthæ and noma, are quite frequently observed in idiots, and are doubtless due to the same cause.

For the same reason no doubt, and also because of their gluttonous habit of swallowing their food insufficiently masticated, they are very subject to digestive disorders, to enteritis, often more or less chronic, and in a peculiar manner to abscess of the liver; this latter is encountered with an altogether abnormal frequency in idiots, showing that there is a special predisposition to it in them.

We need not dwell upon the intercurrent diseases to which idiots may succumb; they are of course at least as subject to such as are normal children. But as we have just remarked, they are peculiarly susceptible to bronchopneumonia, which carries off a good half of them, to pulmonary tuberculosis and gangrene, and to abscess of the liver.

One condition which contributes singularly to aggravate all the affections with which idiots may be attacked is their inability to complain and to indicate the seat of their pain. Furthermore, auscultation is very difficult in them by reason of the abnormal and irregular way in which they breathe, and even that of the heart is impeded because of the impossibility of making them hold the breath while one listens. It is consequently not rare to see idiots die apparently suddenly from troubles which they have had for several days. It is

not uncommon to find at the autopsy evidences of an old pleurisy, a typhoid fever, a pulmonary gangrene, an abscess of the liver, or a suppurative meningitis, when during life there was nothing to lead one to suspect that the patients were ill. I have personally seen instances of each of the above-mentioned surprises. All this renders the diagnosis very difficult and sometimes even impossible in these cases, and we may readily understand also how beset with difficulties the treatment may be.

Along with the complications of which we have just spoken and which refer to the different organs, there are others relating especially to the nervous system, upon which we may dwell for a moment. These may be divided into two categories: those which merely cause the addition of special symptoms to those of the idiocy, and those which may lead to a fatal issue. Among the first we may mention affections of the spinal cord which may exist apart from idiocy, such as athetosis, cerebellar ataxia, and especially Little's disease, which is encountered quite frequently in idiots. Among the second we note especially convulsions, epilepsy, and meningitis.

Meningitis may supervene during the course of idiocy or may be its immediate cause. The latter is the most frequent; yet we sometimes see cases, especially in early life, in which the symptoms of idiocy are already present and convulsions have occurred, in which meningitis supervenes and carries off the patient or aggravates his idiocy. After a certain age, however, the occurrence of meningitis is rare except when it is due to some cause which might produce it in a normal individual, as for example the infection of pneumonia or of typhoid fever.

Convulsions are almost the rule in idiocy, either congenital or acquired. In congenital idiocy they are the consequence of cerebral lesions which have developed during intrauterine life and which are the direct cause of the idiocy. They indicate merely that the pathological process is still progressing. In acquired idiocy they may also be due to cerebral lesions produced in the course of some general disease or as a consequence of a fall or a blow on the head; but they are often the cause itself of the idiocy, or at least the first symptom of the morbid process occurring in the brain. They indicate that the cerebral development is going on under bad conditions, and whether cause or consequence they are very common and of grave import in idiocy. But just as in the case of children who do not become idiots, but are simply nervous, convulsions often occur reflexly and are the sole indication of the quick response of the brain to peripheral or visceral excitation. If the convulsions are frequently repeated we may well imagine that the brain, still young and in process of evolu-

tion, cannot support these repeated shocks without undergoing some profound injury.

The consequence of this trouble is a complication which we meet with in about half of all the cases, namely, epilepsy. It is often very difficult to say whether the intellectual weakness is the consequence of the epilepsy alone, or whether it, like the idiocy itself, is not due to the presence of the cerebral lesions. When the epilepsy occurs early, it would appear to be evident that the two troubles are the direct results of the brain lesion. When, however, the epilepsy supervenes only towards the age of eight or ten years, as is most commonly the case in true epilepsy, and not until the child has already given evidences of a moderate degree of intelligence, it is probable that the intellectual arrest is attributable to the epilepsy itself. But there are a great many intermediary cases in which it is impossible to give an opinion. In truth, however, this is a matter of merely secondary importance. That which is certain and which is the most important, is that the combination of idiocy and epilepsy is very grave from a prognostic and therapeutic point of view. In this case indeed the physical and intellectual deterioration occurs with much greater rapidity; the patients frequently fall into a status epilepticus, and finally, if they have been susceptible to a certain degree of intellectual development as the result of education, we see them lose in a single day, as the result of a series of attacks, all the good which had laboriously been gained up to that time.

But apart from these general or nervous complications to which idiots usually succumb, there are other causes of death in a measure peculiar to them. There are some among these creatures who lead a most precarious existence from the moment of birth, who are confined to bed, incapable of movement, utterly helpless, and absolutely unconscious, who succumb to the first intercurrent affection. But they often die without our being able to find anything post mortem which would account for their death. They succumb to a sort of athrepsia. But it is not alone the profound and incurable idiots who thus die without apparent cause, for it is not rare to see idiots of six, ten, or twelve years die in the same way, when nothing can be discovered at the autopsy. Little by little the child declines, that is to say, loses strength, becomes helpless, and is confined to the bed. He then dies gently from progressive cachexia. This mode of exitus resembles that of an old man affected with senile dementia. The idiot is worn out before his time and dies from vital incapacity, if we may use the term. This termination is rather frequent in idiocy but has not, I think, hitherto been noted in a sufficiently precise manner. It is, however, somewhat interesting from a general biological standpoint.

Prognosis.

After what has been said we may readily understand that the prognosis of idiocy is gloomy. Many congenital idiots are never capable of the least progress, and die at a very early age. Among many others complications, such as convulsions or epilepsy, render their development impossible and hasten their death. In a certain number of others acquired diseases, which develop very readily in this depraved soil, carry them off. Others finally die because their period of evolution is terminated by a sort of precocious senility.

Is a recovery possible? If we understand by that that the cerebral lesions which have caused the intellectual weakness may be arrested or rather may cease spontaneously to progress, we may reply in the affirmative; but if by that is meant that the intelligence may reach a nearly normal level, it would be erroneous to believe it. For my own part I have never seen a single idiot cured or rendered capable of living by himself in society. It is sufficient to examine the brains of idiots, to study the pathological anatomy of idiocy, to be at once convinced that no other result could be possible.

There are some who can be helped in a certain measure. These are the ones suffering from cerebral malformations or from localized sclerosis, or the microcephalic. In these cases the unaffected portions of the brain may be developed, and it would be wrong not to endeavor to utilize them for the individual's benefit. But in the case of acquired idiocy, of meningoencephalitis, or of rather pronounced hydrocephalus, all hope of practical results from therapeutic intervention would appear to be illusory.

Treatment.

What we have just said shows that we must not look for great results from the treatment of idiocy. And here a question presents itself at the very start, whether, namely, there is any use in educating idiots in the way that is attempted in consequence of the completely erroneous belief that they are unhappy in their deprivation of the intellectual and other satisfactions which normal individuals enjoy. Since one is deprived only of what one knows about, the sentiment of this privation in the idiot would indicate a rather advanced degree of intellectual and moral development. But sensitive souls may reassure themselves, and the instruction, patterned after that of normal children, which people pretend to give idiots in many establishments at the present day, is, in my opinion, so far from being

helpful to them as to be rather injurious. We shall return to this question shortly.

The treatment comprises three aspects—the prophylactic, the surgical, and the medical and moral or the medico-pedagogic.

Prophylaxis.—In the case of certain profoundly degenerate families having a grave nervous taint, such as epilepsy, idiocy, or imbecility, in their antecedents, having convinced them that they are burdened with a nervous and mental heredity, we may possibly in a certain measure prevent their descendants from being afflicted with the same taints in the same degree by indicating certain precautions to be taken, first as regards procreation, and then during pregnancy. The mental and physical condition of the parents at the moment of conception is a matter of very great importance; drunkenness or even a condition of simple intoxication in one or the other parent may cause a profound disturbance in the development of the germ. During her pregnancy the mother should avoid the sight of epileptics or of idiots, and also any deep emotions or profound mental impressions; we have seen, indeed, that maternal impressions have a much more marked influence upon the product of conception than is generally admitted. She should also avoid physical fatigue and any occupations which may expose her to blows on the abdomen. The moral condition of the mother during pregnancy has also a great influence, and anything which may cause mental depression in her should be avoided as far as possible.

During childbirth the labor should be hastened as much as possible in order to avoid asphyxia, which, as we have seen, is a frequent cause of idiocy. The employment of chloroform during confinement has been incriminated, but I have never seen anything to confirm this assumption. Certain forms of idiocy have also been attributed to the milk taken by the child, especially goat's milk, but there is little basis for this belief. If the mother is very nervous it is better that the child should be nourished by a healthy and robust wet-nurse than by the mother herself.

When asphyxia has occurred at birth we should be especially careful to protect the child from any influences which might produce congestion of the nervous centres. Its digestive functions should be the object of special concern. As soon as it begins to have control of the sphincters we should teach it to be regular in going to stool. The life of nervous children should also as far as possible be perfectly regular, both constipation and diarrhœa should be avoided, and we should also be on the watch for the slightest tendency to internal convulsions, which often pass unperceived unless we are forewarned. The child should be kept under special observation during the period

of dentition, at which time we frequently find nervous or digestive accidents.

These prophylactic measures, which are not applicable when the idiocy is congenital, are scarcely ever applied by the parents when acquired idiocy is to be feared. It is, however, the duty of the physician to give directions to his families as to what is to be done in order to avoid as far as possible the accidents which threaten. When idiocy is once declared, we have another task before us.

Surgical Treatment.—As a consequence of erroneous conceptions concerning the causes of idiocy the attempt has been made to treat this condition by surgical measures. Lannelongue, accepting the theory of Virchow that microcephalus is due to the premature ossification of the cranial sutures, proposed craniectomy. He divided the bones of the cranium longitudinally on each side of the median line, or on one side only, without incising the dura mater. As the operation was done antiseptically no inflammatory accident followed, but there was no intellectual improvement. One must never have seen the brain of an idiot to have imagined for a single instant that this operation would have any result whatever. The theory upon which it rested is false, not only for the different forms of idiocy in general, but even for microcephaly, in which it is not rare to find the cranial sutures unossified. Furthermore, even were this theory correct, the greater space for expansion which it was sought to give to the brain by performing craniectomy was impossible to obtain, not only because the osseous opening thus made had no effect in enlarging the cranium, but also because the dura mater itself is inelastic. This operation, based as we have seen upon pathological, pathogenic, physiological, and even mechanical error, after having had, thanks to the name of its author, a certain ephemeral vogue, was soon entirely abandoned. I need not, then, dwell further on this unfortunate attempt at surgical treatment.

Medico-Pedagogic or Medical Treatment.—We now come to the medical treatment properly so called. It is not my intention to give here in detail all the multiple and varied procedures which have been employed in the treatment of idiocy, but rather to indicate merely the general rules upon which these procedures are based. The treatment of idiots comprises hygienic, medical, and pedagogic measures, an *ensemble* to which Bourneville has given the name of medico-pedagogic treatment.

As regards hygiene it is sufficient to remember that all the functions are sluggish in idiocy and that the physical development is reduced to a minimum. Therefore all those hygienic measures, fresh air, good food, proper clothing, cleanliness, exercise, etc., which are

capable of giving a greater development to the physique should be employed. In the first rank are the giving of proper food and the exercise of cleanliness. We must be very watchful of what idiots eat and in what way they eat, for their voracity is often a cause of accidents, either respiratory (foreign bodies in the air passages) or digestive. When they are helpless we must see to it that night and day, at regular hours, they are placed over a vessel and kept there until the necessary evacuations have taken place. In this way we implant in them a habit of regular discharge of these functions, and in the course of time they may come to have themselves command over them. We must not leave children too long in bed, for in that way they often acquire vicious attitudes.

We should endeavor to combat anything which may cause cerebral congestion. For this reason the mattress and pillow should both be of hair. The child should live in the midst of calm, in the country if possible, and should be made to exercise moderately every day, short of fatigue. One of the first indications to be met is scrupulous regularity of life.

Hydrotherapy is useful. Massage in certain cases of cerebral sclerosis, accompanied by contracture of one or more of the extremities, may be advantageously employed.

The medical treatment properly so called is directed especially to the physical development of the idiot and to the treatment of complications. All exercises of the limbs which may increase the strength and the power of coördination should be employed. Séguin the younger has described very carefully the education of an idiot's hand. The same might be done for all the other organs, and precise directions might be given for developing their natural functions. The use of special gymnastics—concentric movements or the system of oppositions—is of great value in regulating the movements of extension, retraction, and flexion. We must, indeed, teach idiots all the usual movements of which they will have need at every moment of their lives, so as to put them in the way of learning if possible some manual trade. We must first develop the power of prehension and then we make them execute rhythmical, regular, and especially well coordinated movements.

The medical measures are quite limited in number. We may employ baths or douches for their tonic effect or to calm certain patients. It will sometimes be of service to administer bromide of potassium to those who are subject to convulsions or epilepsy. Apart from that the medical measures at our disposal are the same as those applicable to disease occurring in mentally normal individuals.

In the case of cretinoid idiocy the thyroid treatment has given

good results in certain reported instances, and it ought always to be tried.

We now come to the pedagogic treatment, or rather the *education* of the idiot. In this we ought, I think, to distinguish two things: first, the means adapted to teaching these children all that is necessary for the maintenance of their existence in the material sense; and secondly, intellectual education properly so called. In just the same degree as I am in favor of all the methods which have for their object the placing of the idiot in a condition to act properly in the presence of others, without the necessity of others' assistance in the ordinary affairs of daily life, such as dressing, eating, and attending to the excretory functions, etc., and just as much as I am in favor of endeavoring to develop in him the power of speech, just so far, on the contrary, do I regard as useless any attempt to teach him abstract notions, such as reading, writing, drawing, arithmetic, history, geography, botany, or zoology.

One question, which recurs very readily to the mind when we consider the brain of an idiot, is, What possible effect upon such lesions can be exerted by the efforts which are made every day in the way of instruction? Unless what we know of cerebral physiology is false, it is very evident that an idiot in whom the third left frontal convolution is sclerosed can never talk; that another whose frontal lobes are tightly adherent to the pia mater will never be able to understand or remember anything; and that another in whom the motor zone is destroyed will never be able to make the movements which depend upon it.

I certainly would not go so far as to maintain that idiots should be left entirely to themselves, but I believe that it is time for a reaction against the sentimentalism which would seek to give them an education above their powers and their needs. Of what possible good would it be to teach them to read when they could never understand what they read; to teach them to write if they never can do more than copy, or even if they could learn to write from dictation; of teaching them arithmetic if they were never able to count the money that one might give them? On the other hand, everything which may help to utilize in a certain measure the feeble means which they have in their power for any sort of work ought to be made use of.

And first of all they should be taught to serve themselves, to wash and clothe themselves, to eat properly, to use a spoon, a fork, and a glass. In order to accomplish this special means must be employed, the endeavor should be made to develop their sensorial apparatus as far as possible by special methods—nothing could be better; but to spend at times considerable sums in the attempt to teach them things

which will never be of any service to them is, I think, a tendency against which a little reaction is desirable.

What ought, in short, to be our aim in the education of an idiot? It is to render him capable of living in the society of normal individuals, causing them the least possible inconvenience and demanding the least possible assistance from them. It is, in other words, an exclusively practical education that we must limit ourselves to give him. But another question at once proposes itself, namely, Where and at what age should we begin to give idiots their education?

As regards the age, we may say that, just as in the case of normal children, we should endeavor to teach them from the cradle certain habits necessary to fit them for a life in the community. But as a matter of fact, in the majority of cases it is only between the ages of four and seven that this education is usually begun. The parents do not wish to be separated from their child, for whom they entertain all the greater affection as he is an unfortunate and one of the disinherited by nature. The mothers bestow on them absurd and in general excessive care, and instead of making the best of the feeble rudiments of intelligence that exist they make no attempt whatever to develop them. Thus it is necessary to take the child away from the family and place him in a special institution to be educated. But we meet here with a stumbling-block at the very beginning. In order that the education may be profitable to these creatures it is indispensable that each master should have the direction of a very limited number of them. Their attention is so feeble and so difficult to fix that if the master has to occupy himself with too large a number of pupils no one will profit sufficiently by his instruction. This is what happens in the large public institutions, where, as at Bicêtre, a pretense is made of giving idiots an education modelled after that of the primary schools. If the child can be placed in a private institution the necessities of his treatment demand an expenditure which every family cannot meet, especially when it is a question, not of several months, but of several years. If people would limit themselves to instructing idiots in the things that are essentially practical and of daily necessity, and to teaching them some trade, much better results would be obtained; the necessary assistance demanded by them would thereby be made much less burdensome and the expense which they cause would be lightened, although we could never even then hope that they might repay the cost of their education and maintenance or even support themselves later by the little work they are capable of. In this respect statistics are deceptive, especially those of establishments like Bicêtre, where there are shops for the employment of the idiots as locksmiths, basket-makers, printers, tailors, etc. The truth is

that the work which pays the expense of these shops comes, not from the idiots and imbeciles in the institution, but from the vicious, the perverts, the epileptics, who are ordinarily taken care of under the same conditions as true idiots. All the expense of school instruction is therefore absolutely superfluous, and the money might be much better and more usefully employed in relieving the misery of other infirm beings or in assisting individuals who are capable of working and of producing.

We must first of all develop the power of locomotion in the idiot, and then that of speech, which will place him physically and intellectually in relation with others. Next we should develop as far as possible the special senses. It is indeed by means of them that we shall be able to awaken in these beings the few ideas which they are capable of receiving and of teaching them the daily cares which they should give to their persons.

It is not for me here to enter into details of the methods most suitable for the education of the different senses and of speech. The rôle of the physician is not so much to apply them as to direct their application by special masters and to point out in what cases and how far the efforts of the latter are to be directed. For reasons which I have indicated above and which follow from anatomicopathological considerations, it is wholly useless to lose time in the endeavor to develop any sense or to recall any lost movement, if we know that the brain centres which preside over these functions are irremediably destroyed. The physician's duty is therefore limited to this particular examination, a very difficult affair, in order to establish a prognosis, not only general as to the intellectual state of the child, but also particular as to the condition of the different intellectual functions and the direction which we should give to the physical and moral education of the child, taking as a basis his organic, and especially his cerebral condition. But I cannot repeat too often that our efforts must be directed especially to the manual instruction of idiots. They should be sent to the shop and not to the school. It is under this condition that we may succeed in deriving from them the greatest profit for themselves, and for society the slight benefits which they may offer to it as a compensation for their worthlessness, and for the expense which they impose upon the community.

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CRIMINAL ANTHROPOLOGY.

BY

CESARE LOMBROSO,

TURIN.

CRIMINAL ANTHROPOLOGY.

Crime in Nature.

In Plants and Animals.—In the beautiful pageant of Nature we do not find either justice or kindness; from the carnivorous plants which attract their victims almost, one might say, with strategy and premeditation, to the struggle between animals which live and acquire strength by killing other animals, frequently even those of their own kind, it represents the triumph of force and tyranny. When animals such as monkeys, elephants, horses, and more especially domestic animals are associated together, we may often find in them the phenomena of crime as it appears among the civilized human races, particularly in animals which possess special abnormalities in the formation of the cranium, such as horses with an arched nose (*nez busqué*) and retreating forehead, which rob and wound their companions, and the rogue elephant, which, unlike the generality of its kind, injures man, lives in isolation, and often wounds its associates. In this category also belong many domestic animals which, while gentle in youth, become wicked in old age, or under special circumstances, or in the fury of madness. Examples of this are found in the drunkenness caused in robber bees by wine or ether, in the period of sexual excitement during which female canaries and rabbits kill their young, in the acts of sodomy committed by mares in stables when there is no stallion present. Still greater similarity to human criminals is shown by the fact that sometimes animals exhibit a species of remorse, or else, lacking it, receive some punishment from their tribe or family, or are avoided by their kind because of some organic abnormality. Neander and Vogt tell of true punishments inflicted (in swans for example) by a species of tribunal, but the truth of this is not yet fully established.

Among Savages.—Among savages crime is not the exception, but rather the general rule, so that it passes unobserved, and is in the beginning confused with less criminal actions. Language affords us a proof of this fact.

According to Pictet *crimen* is derived from the Sanscrit *karman*, which is equivalent to *action*, *kri* to do. So *apaz*, Sanscrit for sin or transgression, corresponds to *apas* = *opus* Latin, *opera* in Italian. And

in Latin *facinus* is derived from *facere*, and *culpa* (fault), according to Pictet and Pott, is derived from *kalp*, *krlp*, Sanscrit for "to cause to be performed." Vannicek considers that the Latin *fur*, thief, is derived from *bahr*, to carry, as *ganav* in Hebrew, and *sten* in Sanscrit correspond to "to put upon one side," to hide, to cover. Also πειράω in Greek, from which is derived pirate, means "to attempt, to try," the Greek κλέπτω means "to hide" and "to steal," and is derived from the Sanscrit *harklap*, to hide and to steal.

The act of copulation suggested nothing immodest to the minds of many ancient peoples. The inhabitants of the Caucasus, the Ausi of Africa, and the Indians performed it in the presence of any one, just as do the beasts (Herodotus i., 305), and venery was so mixed that a woman belonged to all the males of the tribe. From this promiscuousness resulted the strange custom of the *couvade* which was practised in America and Asia; this simulation of the puerperium by the husband appeared to be necessary in order to establish the fact that the presumed father had had a part in the birth, and therefore in the possession and control of the son (Taylor).

These facts enable us to understand how it was that primitive people considered hospitable prostitution in the light of a duty. The expressions *far le corna*, *far becco* or *cervo* to one's husband (*i.e.*, to be unfaithful to him), the Hebrew *keren*, the German *Hörnerträger* (cuckold) lead to the suspicion that our ancestors had connection with animals, as sometimes happens at the present day among the Finns with the reindeer when they are absent from women several months.

Abortion, which in its voluntary form is unknown to animals, is common among savages. It is a common practice among the Aborigines at Hudson's Bay and in the basin of the Orinoco. The Payaguas in La Plata oblige their women to abort when they have already had two sons.

The custom of abandoning the aged and the feeble, which also occurs among animals, by reason of an excess of population, becomes established by hereditary transmission. Thus among the Hottentots, as soon as an individual becomes too old to work and is useless, he is left in some isolated spot to die of hunger. In New Caledonia the victims themselves consider the custom a perfectly natural one and ask for death. The killing of the aged and the sick is not exclusively the practice of savages, for it was also at one time practised in Europe.

Absolutely savage and primitive tribes do not understand the idea of property rights, and even less what is meant by theft, which indeed represents evident advantages to them. In Egypt robbery was regarded as a profession. Any person wishing to practise it registered

his name upon a public tablet, and deposited his booty in an appointed place. Even among the more civilized people a community of goods was long the custom, as in Peru and Mexico. Just as in the case of stealing, very few of what we call crimes receive any attention from the lawmakers of barbarians.

In the Fiji Islands the acts considered worthy of punishment were not many, and resolved themselves into theft, adultery, rape, magic, incendiarism, and disrespect to important personages. The list of what are regarded as crimes among even the best governed savages while reduced to but few heads, which even then are recognized as such in a tardy and irregular manner, and while not containing many of the actions which we regard as crimes, contains others which are grave in their eyes and not at all so in ours; as for instance, the lack of observance of established usages and of religious customs, the two really becoming one through the general tendency to perpetuate customs until they are regarded as sacred. The reason for this is that although man enjoys innovations on a small scale, he has a real horror of great and radical changes. Even at the present day common people shrink with dislike from anything tending to change their old-established customs.

The origin of punishment is seen from the foregoing statements to have come from the abuse of evil and the creation of new crimes. Thus vengeance, and the revengeful taking of human life which was not only permitted, but was to a certain extent obligatory, became gradually subject to legal restrictions among less barbarous peoples, placed in the hands of the chiefs and priests, strictly limited to the daytime and to certain months of the year, finally reduced to a money compensation, and thus converted into a species of punishment. Thus also the simony of the priesthood, and the avarice of kings who were always seeking some new pretext for exacting compensations, led to the formation of courts of justice.

In Children.—In the child, after the first nine months and certainly after the first year of life, we may sometimes observe violent attacks of anger and jealousy, and later falsehood, a complete lack of true affection, and a lack of kindness which causes it to wound animals, and persecute the weak and the feeble-minded. Such children are always vain to the degree of delirium grandiosum. As early as seven or eight months they are vain of new shoes and hats, and except in the case of such as are unusually active in games of play, they are extraordinarily lazy. These characteristics may disappear at the age of seven, nine, or at latest twelve years, but become permanent and are especially marked in children possessing many signs of degeneracy. Thus in an examination of 160 children, 44 per cent.

were found to have exaggerated immoral tendencies, and 69 per cent. of these had the characteristics of degeneracy; while of the children who had but a slight tendency to immoral habits, 30 per cent. only had the signs of degeneracy.

The careers of 29 children were studied throughout their lives; of 11 who were physically normal 8 remained morally normal, 3 were almost immoral, but improved later. Out of 18 who presented many degenerative signs 4 remained good and 2 became criminals; 12 were abnormal physically and morally from infancy, 6 of them becoming criminals and 6 improving.

Although infants may present the types of criminals or savages, yet unless they possess special hereditary predispositions which are often shown by physical signs, they become moral individuals, just as the human embryo in the early stages of fœtal life presents characteristics of the inferior animals, which gradually disappear in the later months of embryonal life. But the transitory immorality common to children suggests the fact demonstrated by a study of natural science that crime has an atavistic basis.

Pathological Anatomy.

The results of the examination of the crania of six hundred and nine criminals, in which unfortunately there were no means of ascertaining whether the criminality was congenital or acquired, were as follows:

	Per cent.		Per cent.
Projecting superciliary ridges	46	Occipital flattening	13
Anomalies of the wisdom teeth	44	Incus bone	14
Closure of the sutures	43	Stenocrotaphy	10
Microcephaly	32	Trochocephaly	9
Plagiocephaly	25	Subscaphocephaly	10
Wormian bones	22	Oxycephaly	4
Simple suture	18	Coexistence of many anomalies	43
Median occipital fossa	16	Isolated anomalies	21
Symbolic suture	13		

From the study of two hundred and thirty-six crania by Corre, Benedikt, Flesch, Roncoroni, and Ardu we find:

	Per cent.		Per cent.
Retreating chin	10	Anomalous nasal notch	48
Obliquity of orbit	19	Traces of the optic base	9
Enormously large upper jaw	19	Synostosis of the atlas with the occipital bone	7
Prognathism	69	Sclerosis	36
Frontal process of the temporal bone	48	Masculinity in women	9

The majority of these characteristics are found in the greatest

proportion in the crania of savages and of animals, in less proportion in those of lunatics, in the least proportion in those of the sane. From

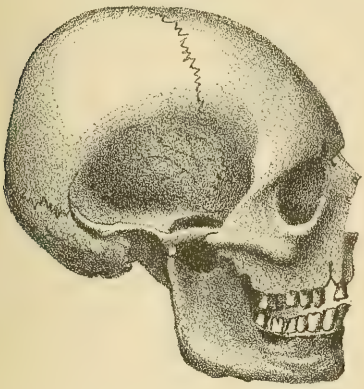


FIG. 1.—Skull of a Professional Thief.

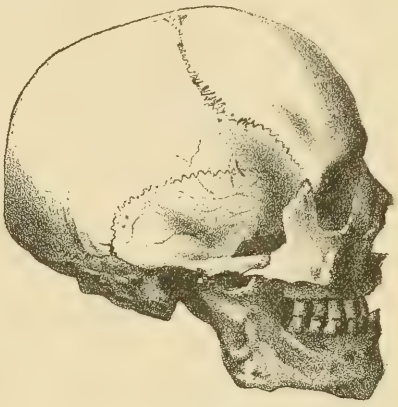


FIG. 2.—Skull of a Brigand.

a study of the sane and of criminals in the same province we find that cranial and facial asymmetry exists in criminals and normal beings in the proportion of from 42 to 20 to 6; sclerosed crania as 31 to 18; enormously enlarged jaws as 47 to 33; the presence of a median occipital fossa as 16 to 3 or 5 (see Fig. 4).

In the brains of criminals the recent researches of Benedikt, and especially those of Mondio, Husch, and Fallot, have shown the great depth of the second external fissure, the superficiality of the

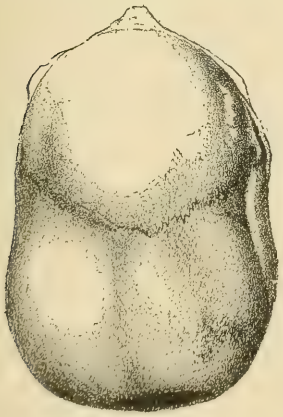


FIG. 3.—Skull shown in Fig. 2. Seen from above.

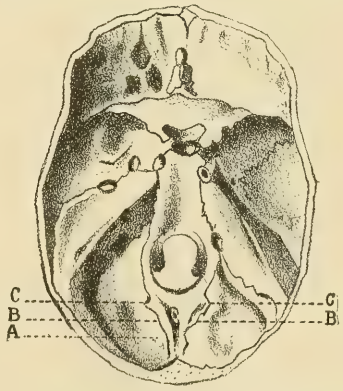


FIG. 4.—Base of the Skull of a Criminal. *A*, Median occipital fossa; *B*, ridges bounding the fossa; *C*, bony tubercles projecting from these ridges.

gyri cuneiformes, the formation of an occipital operculum, the duplication and triplication of the frontal convolutions, the absence of one

of the folds of the external fissure, the vertical direction of the central

FIG. 5.—Cortical Sections from the Frontal Lobe of (A) a Normal Subject and (B) an Epileptic (Schematic). 1, Molecular layer; 2, external granular layer; 3, layer of small pyramidal cells; 4, layer of large pyramidal cells; 5, internal granular layer; 6, polymorphous layer; S.B., white substance.

fissure, the uncovering of the island of Reil, and the complete absence of the sulcus occipitolateralis temporalis.

In a woman thief Flesch found a true median cerebellar lobe, with two sulci which passed the median fissure, diverged in front, and crossed the whole length of the hemispheres and the horizontal

convolutions of the median lobe found in the inferior mammals. Valenti found fusion of the optic thalami, an atavistic occurrence rarely met with in normal types. Of even greater importance is the discovery of Roncoroni, who found in congenital criminals and in epileptics absence of the internal granular layer of the cerebral cortex, an exaggerated size and scarcity in number of the large pyramidal cells, and the presence of nerve cells in the white substance, as in the Gallinaceæ (Fig. 5). Out of 26 epileptics the internal granular layer did not exist in 7 cases, and was greatly reduced in 14; of 16 congenital criminals, it was absent in 7, reduced in 5. On the other hand, in cases of acquired insanity, or of criminals "from opportunity," the internal granular layer is normal. The increased size and diminished number of the nerve cells was very marked in 13 epileptics and in 6 congenital criminals. The presence of a large number of nerve cells in the white matter is of rare occurrence (Roncoroni).

Other atavistic alterations were more frequently noted in form and proportion similar to those of savages, and concerned especially the face and the cranium; they consisted in sclerosis, marked frontal sinus, retreating forehead, a gutter-shaped nasal notch of the frontal bone, median occipital fossa, ankylosis of the atlas, virile aspect of the female cranium, a double articular surface of the occipital condyle, flattening of the palate, Wormian bones, enlarged or oblique orbits, olecranal fossa, a diminished or increased number of ribs or of vertebræ, anomalies of the small adductor muscles, and division of the brachial artery too high up. These lesions, which vary in occurrence from two to fifty-eight per cent., and singularly enough are more numerous in males than in females, are found grouped in the same individual in such a way as to form a type in forty-three per cent. of the cases, isolated in either sex in twenty-one per cent., but are much more rare (especially the existence of the median occipital fossa and plagiocephaly) in women. To these atavistic anomalies of the skeleton may be added the frequent presence (double that in the normal subject) of the olecranal fossa, and the deficiency of vertebræ.

The anomalies in the brain are of an analogous order, the measurements being usually below the normal, except in a few rare cases of hypertrophy; the convolutions frequently show atavistic anomalies, such as the separation of the calcarine fissure from the occipital, the formation of an operculum occipitale, the formation of the vermiform process as in the median lobe of birds, and frequently its hypertrophy; or else there may be deviations of an entirely atypical nature, such as transverse sulci of the frontal lobe and a tendency to confluence of the convolutions.

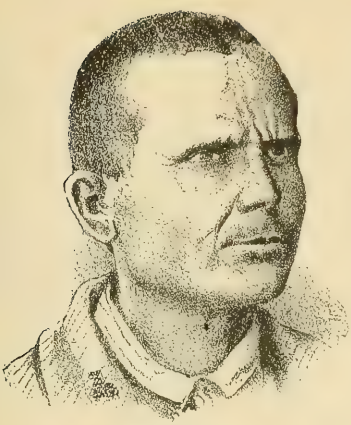
The few histological data which have been obtained all point to atavism and to preëxistent hyperæmias, especially of the nerve centres; they consist in dilatation of the lymphatic vessels, thickening of the adventitia, and pigmentation of the nerve cells and the connective tissue. This preëxisting hyperæmia is confirmed beyond the possibility of a doubt by macroscopical observations, which show us frequent areas of softening, cysts from embolic processes, and meningitis, in the proportion of fifty per cent.; osteoma four per cent.; and very frequently chronic affections of the endocardium, pericardium, and heart (especially valvular insufficiency), while affections of the liver are not rare, occurring five times more often than in patients who are not criminals.

Certain other anomalies occur much more frequently in criminals than in the normal, or even in the insane; these are not atavistic, and consist in Pacchionian depressions, osteitis, synostoses, sclerosis, cranial and facial asymmetry, plagiocephaly, and an abundance of Wormian bones.

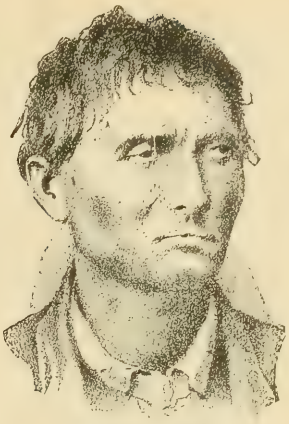
Anomalies in the Living.

Stature and Features.

To sum up in a few words the results of a study of six thousand three hundred and four living criminals, I found that the delinquent when a minor has a higher stature, and when an adult a lower stature than normal, and darker hair; thieves especially are apt to have submicrocephaly more frequently than normal beings, but less often than the insane, while swindlers, bandits, and assassins are apt to have a head of exaggerated size, similar to that of the racial type, but larger. Congenital criminals present frequent cranial and facial asymmetry; this is especially the case with ravishers and thieves, and yet less in them than in the insane, although they exhibit more traumatic lesions of the head, and greater obliquity of the eyes. They less frequently have atheroma of the temporal arteries, abnormal position of the eyes, scantiness of the beard, nystagmus, facial and cranial asymmetry, and mydriasis, and less frequently still, premature grayness or baldness; they have in about equal proportions with the insane, prognathism, inequality of the pupils, crookedness of the nose, and a retreating forehead; the face is apt to be longer than that of lunatics or of the sane, the cheek bones and jaws are more prominent; the eyes are a dark brown, the hair is thick and dark, particularly in highwaymen. Humped backs, which are rare in murderers, are more frequent among ravishers, forgers, and incendiaries; the latter, and thieves to an even greater extent, often have a gray iris, and in stature, weight, and muscular force are inferior to highwaymen and murderers.



A



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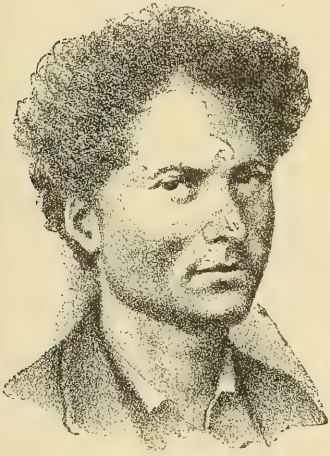

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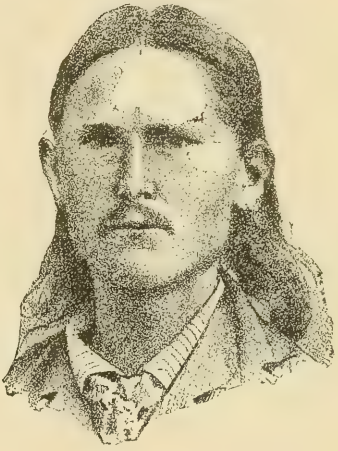

D

E

F

Fig. 6.—Types of Criminals. A, B, C, D, brigands; E, an assassin; F, a common thief.

There are certain differential points in the various classes of criminals:

In assassins we have prominent jaws, widely separated cheek bones, thick, dark hair, scanty beard, and a pallid face. Assailants have brachocephaly and long hands, but narrow foreheads are rare among them. Ravishers have short hands, medium-sized brains, and narrower foreheads; there is a predominance of light hair, with abnormalities of the genital organs and of the nose. In highwaymen, as in thieves, anomalies of cranial measurement, thick hair, and scanty beards are rare. Incendiaries have long extremities, a small atypical head, and weigh less than normal. Swindlers may be distinguished by their large jaws and prominent cheek bones, heavy weight, and pale frequently paretic faces. Pickpockets have long hands, a high stature, black hair, and scanty beards.

Fig. 7.—A Brigand of Basilicata.

These marked differences between the various classes of criminals do not, however, interfere with general family traits or special types, just as the general ethnic type is not done away with by the existence of racial characteristics in different regions. From the study of photographs of criminals we have been able to establish the fact that a typical criminal physiognomy exists in the proportion of twenty-five per cent., with a maximum of thirty-six per cent. in assassins, and a minimum of six to eight per cent. in bankrupts, swindlers, and bigamists; in this connection we may note that the cranial and facial anomalies which Ferri studied from life, more especially the lessened capacity, diminished anterior semicircumference, greater length of face, and prominence of the cheek bones, were in assailants and unpremeditated criminals so slight as nearly to approach the normal, honest type.

Photography has shown us that the ethnic type gradually diminishes among criminals, many of them seeming to resemble each other so closely as almost to appear to be related. It has also demonstrated a femininity of aspect in male thieves and lustful criminals, and virility in the women.

An examination of eight hundred persons of good reputation re-

vealed some of the foregoing characteristics, which were, however, rarely grouped so as to form a true criminal type; they were, moreover, frequently accounted for by latent criminality or by degeneration, especially cretinism (Marro).

Researches upon the living, in short, established the facts shown by anatomical researches, although with less precision and constancy than the latter, namely, the frequence of microcephaly, asymmetry, obliquity of the orbits, prognathism, and prominent frontal sinuses in criminals. It also demonstrated new analogies and differences between the insane and criminals.

Prognathism, the abundance and curliness of the hair, the scantiness of the beard, the frequent dark coloration of the skin, oxycephaly, obliquity of the eyes, small size of the cranium, prominence of the jaws and of the cheek bones, the retreating forehead, large size of the ears, the mutual resemblance of the two sexes, and the greater stretch of the arms, are so many new supports to the facts elicited by post-mortem examinations and which tend to connect European criminals with Australian or Mongolian man; while strabismus, cranial asymmetry, and the marked histological and cerebral meningeal and cardiac anomalies indicate in the criminal a man abnormal before his birth from arrest of development in various organs, especially the nervous centres, and at the same time mark him as a chronic invalid.

Fig. 8.—A Sicilian Assassin.

Type.—The subjoined table will show the proportion in which certain degenerative characteristics occur; it is based upon a study of twenty-five thousand individuals.

	Signs of Degeneration.		
	With five or more.	With three or more.	Without or with one or two.
Normal	4 per cent.	24 per cent.	72 per cent.
Epileptics	29 "	55 "	16 "
Delinquents	27.4 "	33.5 "	39.4 "
Insane	25.3 "	55.2 "	18.4 "

Tattooing.

Of all customs, that of tattooing is certainly the most widely disseminated, especially among primitive mankind; to them it represents an ornament, a vestment, a decoration, a distinguishing mark which is ennobling, honorary, and almost hierarchical. It is the decoration resorted to for sexual attraction, proclaiming nobility in woman, virility in man; it is even a species of ambulatory and living archives of mortgages and law, as it is man's first register of history, and above all his first alphabet.

Andrée tells us that an Esquimo who has killed an enemy puts one or two blue marks under the nose, and acquires the honorable title of *homicide* (Torquota), and the Pagai of Sumatra tattoo themselves with a special sign for each enemy they kill. In Oceanica debtors tattooed on themselves the obligations incurred to their creditors, even marking the quality and number of the objects received. When Toupee, that intelligent New Zealander who was taken to London, went to a photographer, he insisted upon having a clear reproduction of his tattoo marks. "The European," he said, "writes his name with a pen; Toupee writes it here." Herodotus tells us that among the Thracians the plebians alone were not tattooed.

Among Europeans the custom has gradually disappeared in the higher classes, and persists only among peasants, workmen, shepherds, sailors, and soldiers, but especially among criminals. In a comparative examination which I made among 4,880 soldiers and 2,898 prisoners, I found that in the first-mentioned class 11 per cent. were tattooed in the year 1863 (only 1 per cent., however, in 1872), while adult criminals went beyond 9 per cent. and minor criminals 40 per cent.

Lacassagne found 24 out of 156 who had practised tattooing between five and eleven years of age; Battistelli, out of 394 criminals under age, found 122 tattooed. This precocity and frequency of tattooing is a specialty of criminals, but it possesses other singular characteristics as well.

In many cases the designs adopted admirably express the violent, vindictive spirit of the delinquent, or the tendency to resort to desperate measures. One criminal whom I examined had upon his breast between two daggers, the words, "I swear to be revenged;" he was an old sailor, a swindler, and a homicide from vengeance. Tardieu saw an imprisoned sailor who had tattooed the words "Pas de chance" in large letters on his forehead. It would almost seem as if the criminal engraved in his own flesh the presage of his destiny. Another had placed upon his forehead, "Morte ai borghesi" (death to the middle classes) and beneath it a dagger; this tattoo was also

noted in a case seen by Tamassia. Malesen was the most sanguinary convict in New Caledonia, and he was also the executioner; he was covered with grotesque and terrible tattooing from his shoulders to his feet. Upon his chest was drawn a red and black guillotine with these words in red, "J'ai mal commencé—Je finirai mal. C'est la fin qui m'attend" (I have begun badly, I shall end badly. This is the end that awaits me). Upon his right arm which had executed so many men was written, "Mort à la chiourme" (Death to the convict gang).

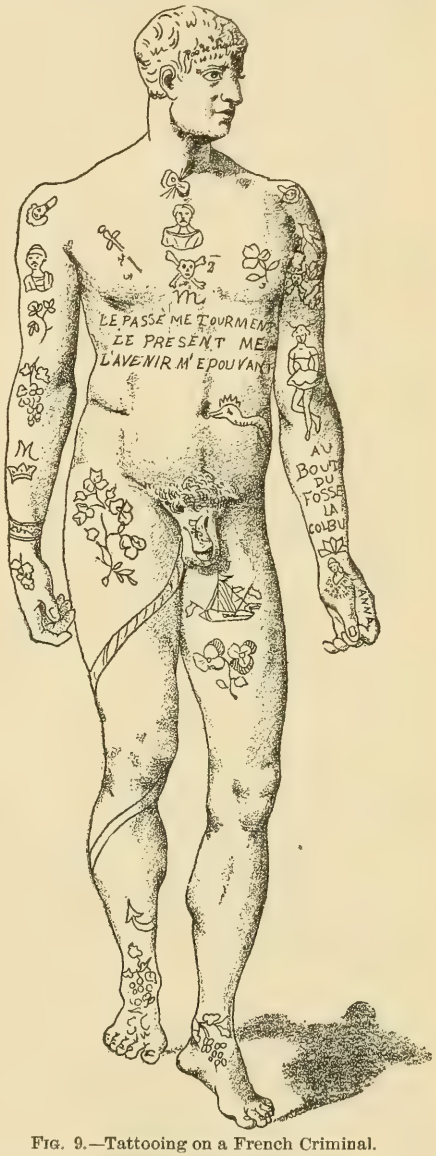

Fig. 9.—Tattooing on a French Criminal.

Lacassagne confirms me upon this point also; he found the most appallingly cynical inscriptions tattooed upon criminals, such as the following: The convict prison awaits me; Always the same thing; The past torments me, the present deceives me, the future terrifies me; Son of misfortune; Death to faithless women; Death to the police; Rather death than to change; Death to the ugly brutes; Long live France and fried potatoes; Death to the French officials; and this still less patriotic sentiment, "La M—— vaut mieux que la France entière."

Another characteristic of criminal tattooing is the obscenity of the design or of the part upon which it is engraved. Of one hundred and forty-two delinquents whom I examined, five were tattooed upon the penis. Three had upon this organ the image of a nude woman; another had the design

of a woman's face so arranged that the mouth was formed by the margin of the urinary meatus, while upon the dorsum of the glans was the royal coat of arms. One individual had the initials of his mistress, and another a bunch of flowers. These facts prove not only the lewdness of mind but the extraordinary lack of sensibility of these criminals. A man who was stabbed in San Luigi, in Turin, had his arms and chest tattooed with pictures of women lifting up their skirts. Upon the abdomen, below the umbilicus, is a favorite place for the tracing of lewd pictures and inscriptions such as "Rubinetto d'amore; Piacere delle donne; Venite, signorine, al rubinetto d'amore; Ella pensa a me."

A special characteristic of criminal tattooing would seem to be its complexity, multiplicity, and its situation upon the most sensitive portions of the body, where even savages avoid placing it, showing the greatest insensibility on the part of criminals. Out of three hundred and seventy-eight cases, certainly thirty-five had the whole body covered. One man had tattooed upon himself a complete admiral's uniform; another had upon his back the picture of an accident which occurred to the Duke of Orleans upon the street in Neuilly, and he had had the patience to sit three hours a day for three weeks for its execution.

Tactile and Painful Sensibility.

The fact that tattooing is so frequently found upon sensitive organs of criminals leads us to suspect the diminished sensibility to pain, and this is confirmed by many other proofs. I myself have seen a woman whose badly bandaged hand actually became gangrenous, and yet who let eight or ten days elapse before seeking medical aid; and I have seen an old thief bear the application of a red-hot iron to the scrotum without a groan, asking afterwards if it was over.

By the use of my electric algometer, with which pain is measured in millimetres upon the sliding scale of Du Bois-Reymond, by determining the distance between the two spools, I have found that the average in criminals was 34 mm., while in the normal it is 50 mm.

In regard to touch, the average is 2.2 to 2.0 at the left index, while in the normal we have 1.70 to the right to 1.75 to the left. Olfactory and gustatory sensibility are notably diminished and more to the right than to the left.

The visual field is sensibly diminished, asymmetrical, and accompanied by shrinkage at the periphery, the last being found also in epileptics. Visual acuteness, on the other hand, is increased, and there is increased sensitiveness to the action of metals and to meteoric changes.

Many have motor tics, exaggerated gestures, and an agility so great as to be monkey-like; greater strength on the left side than on the right in 23 per cent. of the cases. This left-handedness is found to the greatest extent in women criminals 32 per cent., swindlers 33 per cent., and thieves 13 per cent., while in the normal and even in the insane we have not more than 3 or 4 per cent.

The tendon reflex was found to be weak in 23 per cent., and exaggerated in 16 per cent. of the cases.

About 40 per cent. of even young criminals do not blush. This limited vasomotor reaction explains the relative longevity of criminals, centenarians being often found among them, and the greater longevity in convict prisons than in other places of punishment. It also explains the greater body weight, and the complete absence of all compassionate instincts, exemplified in Lacenaire's statement that he would as soon kill a man as drink a glass of water. Melchine describes the Russian criminals of Saccaline as true dilettante cannibals, saying that they laughingly assist at the death of a companion, and joke about their own approaching death; this accounts for that species of courage which is born of a lack of sensitiveness and of want of forethought, they not feeling their ills as do others. This explains too the greater frequency of suicide among prisoners, which in Holland is tenfold that of the normal, and which occurs in prisons even among those condemned to short terms, so that it evidently is not caused by the imprisonment alone.

Mental Characteristics.

Affections.

It would be a great mistake to suppose that all the affections and emotions are extinguished in criminals. Frequently some of these survive while others disappear. D'Avanzo, who roasted and ate the calves of a man's legs, dictated verses in praise of Lagala. Martinati killed his wife because of his incestuous love for his sister. Bezzati loved his wife and children; Fieschi had an affection for the advocate Lasciaude and for his mistress. Lacenaire, on the same day that he killed Chardon, risked his life to save a cat which was about to fall from a roof. Usually, however, among criminals the highest affections become weakened and take on an excessive and unstable nervous taint. Pitsemberg poisoned his wife for the sake of a platonic affection. The Marchioness of Brinvilliers killed her father to revenge her lover, and her relations to enrich her children. Mabille committed assassination to amuse some chance acquaintances at an inn. Gas-

parone became an assassin from undue love for his mistress, whom a few days later he killed on a mere suspicion. Thomas loved his mother passionately, yet in a fit of anger he threw her from the balcony.

The Passions.

In the place of those social and family affections which in criminals are absent, unequal, or unstable, a few other passions dominate the mind with constancy and tenacity. The chief of these is pride, or rather an excessive self-consciousness, which we moreover observe in vulgar persons in inverse ratio to their merit, so that it would seem as if in the spirit there were a repetition of the law presiding over reflex motion (namely, that its activity is always greater with the decreasing action of the nerve centres), only that in this case it assumes gigantic proportions.

Vanity.—The vanity of delinquents surpasses that of artists, literary men, and frivolous women. Upon Lagala's cell were found these words written by her: "To-day, the 24th of March, Lagala learned to make stockings." Crocco endeavored to save his brother. "Should I fail," he said, "the race of Crocco is lost."

The satisfying of vanity, the desire to shine in the world, and to make a fine appearance are the chief causes of modern crime. Those who fall are vain of their strength, their beauty, their courage, their ill-acquired and transitory wealth, and, most strange and most sad of all, of their ability in the commission of crime.

The bands of English thieves, says Mahew, envy each other's crimes and boast of their own superior attainments, which, if they dared they would like to publish upon the outside page of the newspaper. Grelinier, a common petty thief, boasted in court that he invented crimes so as to attain to the rank of great assassin. Motino and Rouget put their own misdeeds into verse.

I have in my possession a letter from a man, condemned for rape, to his wife, which begins, "In this, for me, honorable position," etc. The excessive vanity of delinquents explains why it is that, with such inconceivable lack of caution, they so frequently speak of their own crimes either past or to be committed, thus furnishing to justice the most effective means for accomplishing their own arrest and condemnation. Many of them seem to feel the need not only of speaking of their crimes, but of describing them and thus rendering them more clear to their own minds, and this when the crimes have not been discovered or proved against them.

Vengeance.—The natural consequence of such inordinate vanity is an altogether exaggerated idea of their own importance, and an inclination to revenge themselves for the slightest offence. One man

killed his companion because he had refused to clean his boots. Leduc killed a friend because he accused him of having stolen a few matches. The Baron C—— had P—— killed because during a procession he did not have the image of the Virgin stop under his palace. Militello planned and finally carried out the murder of a companion from childhood for some slight offence, while his companion Afril, in his turn, said to his face, "If I have not revenged myself, it is only because I was not able to do so." Renaud, twenty-two years old, after a slight altercation with Foy, a friend who had freely supported him for years, wounded him and tried to throw him into a well. When he was arrested, although his intended victim forgave him and was unable to account for his violence, he said, "If I am condemned I can endure it, but I am sorry not to have carried out my plan. When I am let out I will kill him." Many years later, when set at liberty, he carried out his ferocious threat.

Cruelty.—At the present time even criminals rarely become ferocious without some cause, or for the mere love of gain. Out of eight hundred and sixty robberies by housebreaking committed in London ten years ago, only five were accompanied by personal violence. Among the strange performances of a gang of stabbers in Leghorn who had vowed to fatally stab some one every day was the case of one of the men who wounded himself and his own wife so as not to be deprived of the accustomed horrible spectacle.

There would appear to be a species of profound psychical change peculiar to criminals and lunatics, which at certain times renders them subject to the causeless attacks of anger so well known among prisoners, and, as we saw above, among animals and savages.

It has been noted by all observers that in point of cruelty and ferocity the few women affected greatly surpass the men. The barbarities conceived by the female brigands of the Basilicata in Palermo and in Paris are not to be described; it was the women who sold the flesh of the carabiniers by lot, who forced a man to eat his own cooked limbs, and who spiked human viscera.

Drink and Gambling.—After the pleasures of vengeance and of satisfied vanity, the criminal finds no amusement to equal that afforded by wine and play. The passion for alcoholic drinks is, however, most complex, it being at the same time both the cause and effect of crime. It is triply a cause indeed, if we recall that alcoholics give life to criminal children, and that alcohol is also an instrument and a reason for crime, either because some delinquents commit crimes in order to drink, or because by drinking cowards acquire courage sufficient to the performance of crime, as well as a certain justification in the eyes of the law; by precocious drunkenness youths are educated

in crime; moreover, and more important than all, the saloon is the place of meeting of accomplices, the habitual resort where not only they plan crimes but where they derive the benefit from it, it being to many their only and true home. Finally, the saloon-keeper is the banker, and a faithful one at that, with whom the thief deposits his ill-acquired gains. In London, in 1860, there were 4,938 taverns patronized only by thieves and prostitutes. Out of 10,000 sanguinary crimes in France, 2,364 were committed in inns.

The passion for play explains that continual contradiction seen in the lives of malefactors, who at one moment exhibit the most furious envy of the possessions of others and at another the most reckless extravagance in the spending of their ill-gotten money; this may also be due to the fact that it is too easily acquired; it also explains why nearly all malefactors, although often the possessors of enormous wealth, end their lives in poverty.

Love.—It is but rarely that criminals feel a true passion for woman; their love is carnal and savage, that of the brothel; in fact, it is almost exclusively limited to the brothel; it is characterized by its precocity, and by an inconstancy which causes it to pass rapidly from love to the most intense hatred. As a rule, this carnal affection is soon extinguished in thieves, and is found to last in exaggerated proportions only in swindlers, poisoners, and some assassins.

Orgies.—These pleasures of play, of drink, of venery, etc., and even that of vengeance, are merely the interludes of a greater and predominating pleasure, namely, that of orgies. These individuals, who are so inimical to society, have a strange desire for a social life of their own, a life of noisy, quarrelsome, and sensual joys in the midst of their accomplices or even of their informers, a true life of revelry.

In many of their characteristics criminals closely resemble lunatics, with whom they have in common the violence and instability of certain passions, a not infrequent insensibility to pain, and besides emotionality, an exaggerated sense of the ego, a passion for alcohol and for recalling their own misdeeds. In regard to sensitiveness and to the passions, however, the delinquent is less like the insane than like the savage, especially in his impetuosity and instability. "Savages," says Lubbock, "have rapid but violent passions; they possess the character of children with the passions and strength of men. A hunter returning from a non-successful expedition, if he chance to find his own child under foot, is likely to catch it by a leg and hurl it against a rock, simply as a vent for his rage. Among them vengeance is looked upon as a delight and a duty, and examples of this spirit may unfortunately too often be found among peoples closely related to our own."

Morality.

For many centuries popular opinion has decreed, "Semel malus semper malus;" 'The thief never repents," etc. The fact is that in most of them the moral sense is altogether lacking; many do not in the least understand the immorality of their actions. In French jargon, conscience is called *change*, and a thief *friend*. In these persons the ideas of duty are completely reversed; they believe that they have a right to steal and to kill, and that the blame belongs to others for not giving them full liberty of action. They finally reach the point of considering crime to be merit. Poets imaginatively depict the disturbed sleep of murderers, while Despine says, "No sleep more closely resembles that of the just than does that of the assassin."

It is true that many malefactors have pretended to repent, but this has been the result of a whim, or of hypocritical calculations made with the design of profiting by the noble illusions of philanthropists to evade or ameliorate their present condition.

In Pavia, Rognoni at his trial spoke in the most affecting language of his repentance; for days he refused wine because it reminded him of the blood of his murdered brother, while all the time he was secretly obtaining it from some of his prison companions. When any of the latter objected to this forced gift, he threatened them in these words, "I have killed four, and it would not take much to make me kill the fifth."

Sometimes what appears to be remorse is merely the effect of a fear of death or of religious ideas which assume the form but not the substance of repentance, as in the case of the Marchioness of Brinvilliers. Others believe that the wickedness of their deeds is diminished or justified by the goodness of their intentions, as in the case of Holland, who committed assassination in order that he might procure bread for his wife and children; or by the impunity of others who commit worse crimes.

The thieves of London, says Mayhew, believe that they do wrong, but not more wrong than any bankrupt does. We must, however, acknowledge that the idea of right and wrong is not completely extinguished in all criminals, but it remains sterile because it is better understood by the mind than felt in the heart, and is choked by evil passions and habits. In Spanish jargon, justice is called "la ginesta" (broom), the same name being given in France to the Assizes, which, however, as Mayor observes, may be an ironical term. It is therefore not good judgment nor knowledge of the truth or of law

that is lacking in criminals, but the will to conform to their knowledge.

In Moscow it is customary to have the faults of evil-doers judged by their mates, and verdicts are obtained which might put our juries to the blush. De Tocqueville tells of the malefactors of America, who are judged with extraordinary fairness by their companions. Except when this species of relative morality or justice occurs spontaneously in the midst of an unjust population, it is merely forced or temporary. When it goes against the interest of certain ones, instead of favoring them, or when violent passions are rearoused, then this appreciation of the right, which had no basis in moral sense, suddenly becomes markedly lessened. Bouscaut caused the arrest of all his companions in the famous band of incendiaries in France. Caruso, a noted leader of bandits, was our greatest help against the brigands.

Religion.—Many persons believe that delinquents are all irreligious, religion being the most powerful restraint from the commission of crime. The fact is, however, that although many of the chiefs of gangs and the boldest criminals, like Lacenaire, Lemaire, Mandrin, Gasparone, La Pommerais, Barre, and others chiefly of the larger cities, find it convenient to free themselves from this restraint to the expression of their brutal passions, the larger number of criminals, especially those in the country, are anything but atheists, although they have adopted for their own use a sensual and accommodating religion which transforms the God of peace and justice into a sort of tutelary deity to criminals.

Tortora, who with his own hand had killed twelve soldiers and one priest (although, as he declared, an excommunicated one), thought himself invulnerable because he carried a consecrated wafer in his bosom. The members of the Manzi band were loaded down with amulets. Caruso's band set up sacred images in the woods and in groves, before which they kept lighted candles. Vidocq found a number of thieves who had a mass offered in order to change their luck, when they had not succeeded for months in taking anything. Giovanni Mio and Fontana, before killing their enemy, went to confession; after the murder, Mio said, "Since neither God nor the priest were willing to mix themselves up in this case, I did so myself."

Intellicence and Education.

Although sentiment is the quality most lacking in criminals, yet their intelligence presents certain marked anomalies. It is not that they are nearly all of feeble intellect or imbecile, as Thompson claims, but that in all, even in criminals possessing real genius, there

is some defective point in the intelligence. The great majority experience a diminution of mental energy for continuous and assiduous work, and their ideal becomes the absence of all work. French thieves call themselves *pègres* (idlers or laggards). Lazy men are legally a variety of the criminal type, and perhaps more than any other class help to populate the prisons. Gypsies, however industrious, are always poor, because they do not love to work except just enough to keep them from dying of hunger. Thieves, says Vidocq, are not adapted to any kind of work that requires energy or assiduity. They do not know how to do anything but steal.

Lemaire said to the judge, "I was always indolent; it is disgraceful, I know, but I am weak in regard to work. Work requires an effort; I cannot and do not wish to make it; I have no energy for anything but evil-doing. If I must work, I do not care to live; I would rather be condemned to death."

The primary cause of Lacenaire's crimes was certainly laziness. A teacher of his in childhood said that he carried it so far that he did not even care to get up in the night to satisfy his natural wants.

Another defect in the intelligence of criminals is their singular lightness and fickleness of spirit. In Switzerland, the malefactors who commit crimes from levity comprise forty-four per cent. of the entire number. Keller says that those who commit the greatest crimes never foresee any possibility of being discovered, and when arrested show their surprise by actions which are often to their prejudice, and enlighten their judges in regard to their crimes. This levity of spirit explains why criminals converse, even with members of the police force, about their crimes, and also the habit delinquents have of associating in a friendly manner with and confiding in the first comer, if his expression and jargon seem to prove that he has leanings towards crime.

One result of this lightness of mind, and the lack of all sense of wrong, is their tendency to defend themselves by giving and dwelling upon the small details of the manner in which the crime was committed, a habit which only confirms their guilt, and for a short time only distracts attention from the chief points. The greatest criminals, even although they show great ability in the planning of a crime, seem to lose their power later, and finally, intoxicated with recklessness, lose all their prudence and betray themselves. Zerbini, who assassinated Coltelli, and then tried to make it appear like a murder by unknown persons, failed to remove stolen objects from his pockets, and left the doors locked.

In many cases the cleverness of rogues seems marvellous, but a study into the matter shows that they succeed so well because they

repeat the same act with such frequency. Not only do thieves confine themselves to stealing, but among them there are some who attack shops only, others limiting themselves to rooms. These specialists in crime may have a specific mentality, as would certainly appear to be the case from a study of extensive statistics. Poisoners nearly always belong to the higher social class, and possess uncommon culture, often being physicians or chemists; they are attractive in appearance, sociable, persuasive, to the last exercising a great fascination over their victims, who are chosen from among their closest associates. The sense of security which they feel, and a species of voluptuousness experienced in the commission of crime impel them to attack more than one person at a time, often with no reason, as in the case of the woman Lamb, who poisoned not only her husband and sons, but a friend, and finally a neighbor with whom she had no special relations.

Pederasts, who are also frequently cultured and skilled (employees, masters), have a strange desire to be associated with many others in crime, and to form a species of fraternity, the members of which recognize each other even in foreign countries by a mere glance.

Thieves, who like prostitutes have a passion for clothing of decided colors, such as yellow, red, or blue, for dangling ornaments, chains and even earrings, are the most ignorant and credulous of the species.

Assassins, when with strangers, affect a soft, sympathetic, calm manner, are but little addicted to wine, but are fond of play and carnal pleasures.

The idler and the vagabond, says Locatelli, is nearly always of a gay, merry disposition, for which reason he is the delight and the buffoon of thieves and assassins in prison. In temperament he is inclined to be calm and is usually sober, avoiding brawls and especially bloody quarrels.

We cannot deny that here and there have been found criminals possessing true creative genius, inventors of new forms of evil. A case in point was Vidocq, who succeeded at least twenty times in evading justice himself, and in causing the capture of several hundreds of criminals, and who in his memoirs delineated a veritable psychology of crime; another was Cagliostro, who robbed and swindled princes and kings, and passed almost for an inspired man, a prophet. Genius was also the attribute of Norcino and of Pietrotto, whom no prison in Tuscany was able to keep more than a month, and who escaped even after having warned their guards of their intention; and of Dubosc, who, after being condemned to death, succeeded in effecting not only his own escape but that of his imprisoned mistress as well.

As a rule, however, even these talented criminals lack either sufficient foresight or the shrewdness necessary to carry out their infamous designs successfully. That lightness of character which is their special characteristic betrays itself even in their genius. The infernal inventions of Desruès, Thomas, Palmer, Faella, Peltzer, and Troppmann, even had they been more skilfully concocted, could not have been carried out with impunity to themselves, because the victims of murders are always survived by associates to whose interest it is to discover the criminal and render his crime profitless to him. As a rule all malefactors, even those possessing genius, have (like the savages) more knavery and cleverness than capacity to carry out designs.

Criminal Jargon.

One of the special characteristics of criminals, relapsed and associated with others, as they always are in large cities, is the use of a language of their own, in which the general assonance, the grammatical and synthetical type are preserved, but the meaning of certain words is completely altered.

This change of meaning occurs in several ways. The most ordinary and most curious method, and the one which brings the slang the closest to primitive language, is that of calling things by their attributes, as *the jumping* for a kid, or *the lean*, *the cruel*, or *the sure*, for death.

This custom enables the philosophically inclined to penetrate into the secret depths of the souls of these unfortunate beings, revealing, for example, the ideas which they possess in regard to justice, life, the soul, and morality. The soul they call *the false*, shame is *red* or *blood colored; veil* is the body; *rapid* means hour, and *sneak* or *spy*, the moon.

Sometimes the metaphorical transformation of words consists of a process which might be called "inverted similes," as, for instance, *wisdom* for salt; *maronte* (*husband*) for mouth; *slanderer* for a witty tongue. In this we see the influence of that epigrammatic wit in which criminals, more rich in wit than in sense, abound. More curious still, and less easy of comprehension is the slang in which a phonetic disguise is added to the metaphor; as *prophet* for pocket or cellar, an allusion probably to their profundity; *philosopher* for bad shoes, a punning allusion doubtless to the similarity in sound between *savant* and *savate* (French for *scholar* and *old shoe*), possibly also to poverty, which they call *philosophy*.

As among savages, many words are created from a resemblance of sound to the thing intended to express, as *tap* for walk, *tuff* for pistol,

tick for clock; an onomatopœia by sympathy is the Italian *ganguana* for lover, *taff* for diffidence, *fric-frac* for extraction. Automatism is not lacking: *papa* stands for the police captain, *nona* for guard, *pipet* for castle, *babi* for hospital, *pipetta* for money. Other transformations consist of an automatism a resulting from reduplication of syllables, combined with suppression or tranposition of letters, etc.

Another source of their vocabulary is the phonetic alteration of words, usually by one of those processes which Marzolo called a "false etymological reduction"; for instance, *orfèvre* (French for goldsmith) for orphan; *philanthropist* for filou (pickpocket); and in Italy, *alberto*, egg, from albumen; *christian*, the cap, from cresta (crest). In Parma, *ramengo* means stick, from ramo and ramengare (a bough, and to rove). Here there is evidently an etymological and phonetic play upon words—that is to say, two names or attributes are recalled and almost run together, as, for example, *Martin Rouant, gendarme*, from Roveau and Rouen, officers of gendarmes and roue (wheel) an instrument of torture. A not infrequent transposition consists in a change of vowels, as, boutoque for boutique (shop), etc., more rarely a whole syllable is interposed. Other changes are due to the addition of augmentatives, diminutives, or expressions of embellishment; more frequently, however, expessions of detraction.

Foreign words play a great part in this language; Hebrew in the German jargon, German and French in the Italian, Italian and Romany in the English. Thus Italians gave to the French *mariolle* (cheat), *furfante* (knave), and *boye* (*boia*, executioner), meaning one who guards the galley slaves; *frit* for lost (*fritto*, lost) and *cadenne* and *cap* for sharpen. In Spanish we find the Italian *parlar* (to speak), *formaje* (cheese), and the French *aller bélître* (to become a rascal). The Hebrew or Jewish language composes the half of the Dutch jargon and nearly a quarter of the German, in which I counted one hundred and fifty-six Jewish out of seven hundred words. The strangest addition to jargon is derived from words which have become obsolete. Thus we have *arton* for bread; *lenza*, water; *cuba*, house (in Sicilian jargon); *strocca*, prostitute (Calabria); *marcone*, the middle; *cubi* for bed. These archaic expressions seem the more singular when we consider the changeableness and inconstancy of jargon.

It is of importance to note the strange richness of synonyms for certain objects or parts of objects which interest criminals the most, and we may thus find revealed the very depths of their souls. Thus Cougnet and Righini found seventeen ways of saying guard or carabinier, nine for sodomy, and seven for purse.

Origin of Jargon.—All authorities explain the origin of thieves' slang by the necessity they are under of concealing their meaning from

the police; it is very certain that this was the principal reason for its existence, especially for the creation of those inversions of words which we have seen to be so common, and of the substitution of various words for pronouns, as *mamma* for *I*, *eight* for one's self. That this is not the only cause may be seen by the use of jargon in poetry, when there is certainly no necessity of concealing the meaning, on the contrary, the effort is made to extend its use by the means of songs, and secure its adoption by the police and by criminals in their own families. In these last-named cases, instead of changing words and expressions entirely, it would be quite sufficient, as Pott well observes, to render them enigmatical by the interposition of certain syllables agreed upon, and yet this is the method least followed in the jargon of evil-doers, and when used is rather as a form of diversion.

The fact is that jargon, although it does not originate with the same spontaneity, has the same general construction and nature as languages and dialects, the latter having become formed and distorted among themselves, according to climate, habits, and new associations.

The tendency to form a new language of their own may be observed to develop in persons who are employed in the same pursuit, especially if that pursuit be of equivocal nature, and if the persons are constrained to lead a wandering life or to reside only temporarily in any one place, and if they are in any position of inferiority before the public. By their special language they emphasize their companionship, or are enabled to escape the vigilance of others. Thus within the confines of a single valley I found a jargon special to the chimney-sweeps, and others belonging respectively to vine-dressers, to waiters, and to whitewashers; and in the immediate neighborhood jargons of masons and tinkers. These jargons were analogous to and sometimes identical with that of criminals. Avé-Lallemant speaks of jargons of hucksters, of prostitutes, of medical students, of school boys, and of charlatans who speak often in rimes. If this is the case with such persons as the above, how much more must a class which possesses such special habits and instincts, and which endeavors to deceive and is also in fear of so many people, feel the necessity of formulating a special language to express its own special ideas? We may add that these individuals always assemble together in the same haunts, brothels, and inns, and have no intercourse except with others who possess the same tendencies; with these, however, they fraternize with extraordinary carelessness and ease, finding in their jargon, as Vidocq has shown, a means of recognition and a password. Were it not for this jargon, the need that they feel of an almost riotous expansion would expose them too much to the vigilance of the police as well as to the suspicions of their victims.

To the formation of this jargon their changeableness of mind and emotions must largely contribute; in the midst of their orgies a new word or phrase, however absurd, providing that it be lively, piquant, or fantastic, will be adopted and put in use, and thus become a part of their vocabulary.

The strongest influence of all, however, is atavism. They speak differently from others because they feel differently; they speak like savages because they are savages living in the midst of the flower of European civilization; like savages, they make frequent use of onomatopœia, automatism, and the personification of abstract objects.

Relapses of Criminals.

All penal statistics agree in showing the constancy and increasing frequency of relapses upon the part of criminals, especially in the more civilized countries. In Prussia, between the years 1871 to 1877, the proportion among liberated prisoners was 78 to 80 per cent. for men, and 74 to 84 per cent. for women. There is no known system of prison discipline which prevents relapses; on the contrary, the prison influence seems to be the chief cause.

Brétignères de Courtelles states that at Clairvaux 500 relapsed thieves or vagabonds had been actuated merely by the desire of finding easier conditions of life in prison; 17 out of 115 prisoners declared that they had taken no precautions in the committing of their crimes, because they felt the need of one or two years of prison life to restore their health after the effects of their orgies.

In Sweden, D'Olivecrona noted that the proportion of recidivists mounted up to 32 per cent. in thieves condemned to prison cells; in those condemned for life to public works and subsequently pardoned, there were from 73.8 per cent. to 81.3 per cent. of relapses. In general, the average of relapses in 1864 was 52 per cent., and in 1870 72 per cent.

Relapses among women show a special constancy; and, as we shall see later, among women, at least, if not among men, recidivists are more numerous than those who have been convicted but once of crime.

If we take into account the great number of deaths which occur, and the large number of crimes whose authors remain undiscovered or unpunished because of the greater skill which they have acquired while in prison, we must come to the conclusion that the number of recidivists among born criminals differs little from that of the liberated prisoners among them.

Varieties of Criminals.

Epileptics and Born Delinquents.

In the statistics of epilepsy in Italy, del Morselli shows us a singular analogy existing between the regions in which the disease is most prevalent and those in which murders are most frequent. Modern research has moreover demonstrated that there are forms of epilepsy which are manifested only by vertigo, and these are the ones which most readily develop into insanity and crime. Cases are reported in which the epilepsy manifests itself only by acts of violence or lewdness, which may last a few moments (psychical equivalent of epilepsy—hidden epilepsy) or be prolonged for days or months, with the absolute unconsciousness of somnambulism, followed frequently, but not invariably, by amnesia. I say not invariably, because recently Samt and Tamburini have reported cases in which the patients remembered the occurrences perfectly. The latest studies of Frigerio, Curdali, Bianchi, and myself upon epileptics and the morally insane show so many analogies between the two as to leave no doubt as to their common origin and nature. Their body weight and height are alike above the normal, and they both have either lessened or exaggerated cranial capacity and an occipital median fossa, while both have the same tendency to encephalitis and meningitis in infancy. The physiognomical resemblance is also complete, consisting in the frequency of prominent cheek bones and frontal bosses, projecting ears, facial asymmetry, a masculine face in women, the frequency of a criminal type (which is in the ratio of twenty-five per cent.), diminution of sensitiveness to pain, frequent left-handedness and color blindness, inequality of the pupils, and exaggeration of the tendon reflexes. It is above all in the psychical domain that the analogies are the most marked, especially in the changes and contradictions of feelings, in the emotional outbursts which take the place of the affections (causing them to pass from hate to the most exaggerated love), in vanity alternating with excessive humility (from believing himself to be a Napoleon, such a one may fairly lick the dust), and in cynicism alternating with extreme piety.

In the frequent tendency to absolute laziness, and in the contrasts afforded to the usual habitual indolence by the energy manifested in evil-doing and in strange and fantastic actions, the minds of even such epileptics as are not imbeciles are absolutely similar to those of born criminals. We may add that not only may there be forms of epilepsy accompanied by short and temporary loss of memory and consciousness, but some accompanied by automatic attempts at suicide, and

the infliction of wounds, usually of an obscene nature, more often by violence of character, and finally psychical perversion, which may be noticed not only during the short attacks whose ferocity it increases and influences but during the whole life of the individual.

We may add, to complete the analogy and to meet the objection raised that many of the morally insane and many criminals have never had epilepsy, that very often an epileptic attack is not observed when it does appear, or occurs at very long intervals and is not remembered by the patient, especially when it is not of a convulsive type. The absence of convulsions not only does not exclude the possibility of psychical epilepsy, with a predominance of morbid impulsions, but experience demonstrates that the latter are as a rule accompanied by vertigo, and most rarely by an epileptic convulsion (v. Krafft-Ebing).

The congenital origin and the greater frequency of occurrence in youth, which are common to both epilepsy and moral insanity are other important circumstances in the demonstration of their analogy. Epilepsy has been called the disease of childhood, and the attacks of rage which occur in children are quite similar to the morbid irascibility of epileptics. Finally, we cannot but be struck by the fact that in both cases there is apt to be a history of alcoholism, traumatism, meningitis, the exanthemata, and other febrile diseases.

I have often called attention to the frequency with which persons wounded in the head suddenly developed irascibility, brutality, and tendencies to theft and obscenity, and to the frequency with which criminals are wounded in the head. I noted seventeen out of three hundred and ninety criminals who suffered from traumatism in the head before the commission of their crimes. Leidesdorf, Battarelli, and Frigerio noted osteomata in epileptics; I found them three times in ninety cases of criminal insanity.

The frequency of alcoholism in the parents of criminals does not stand in need of demonstration; in the cases reported it goes as high as thirty per cent.

Instances in which typhoid fever or scarlatina has given rise to moral insanity are well known.

As to the frequency of meningitis, we would state that Flesch found it in fifty per cent. of cases, and that up to the present time all celebrated criminals have had it, as Lemair, Bénois, Momble, Seger, Greemau, Guiteau, Granier, and Faella. Lasaigne many years ago called attention to the fact that in certain cases meningitis occurring in early infancy seemed to be cured, and to manifest itself in adult age only as perversity and a tendency towards morbid impulses.

Delinquents from Passion and Violence.

As a rule crimes from these causes are infrequent; in Prussia and Switzerland they have been estimated at from five to six per cent. of the other crimes. They occur in persons of the sanguineous or the nervous temperament who not only are not apathetic, but who present an exaggerated sensitiveness and emotionality. For that reason, when arrested, instead of showing the calm impassibility and apathy of assassins, they are excited almost to the point of delirium; sometimes they exhibit this excitement even before committing the crime. Their previous lives have always been known as spotless. Of this kind was Curti, who supported his three poor brothers; Bancal, Bouley, Bounin, Cipriani Milani, and Grasso were noted for their generous and voluntary services to others. Tolu was chosen as judge of the Sardinian shepherds. The letters of Bancal to his mother move one to tears. Nearly all of this class of criminals, immediately after having committed the crime and satisfied their passion, experience a reaction, repent of their deed, and either attempt or succeed in committing suicide. Milani endeavored several times to take his own life. Verani, the murderer of his unfaithful wife and of her lover, declared himself to be a vile assassin, and constantly repeated the last words uttered by his wife.

In contradistinction to ordinary criminals, not only they do not attempt to prove an alibi or to hide their evil deed, but they delight in confessing it to jury and judge, as if to lighten their own sorrow and remorse by so doing. As soon as Marino had killed his mistress he gave himself up to the police. Milani told the police that he was expecting them; Verani, as soon as he had killed his adulterous rival and wounded his wife, took a carriage to convey him as quickly as possible to the authorities.

For this reason, delinquents from passionate impulse are the only ones among the condemned who show one hundred per cent. of reform, as is shown by the Swedish and Prussian statistics. The passions which stimulate them to criminal action are not such as develop gradually and which can be restrained, such as avarice and ambition, but appear suddenly, as anger, wounded honor, or love—passions which are usually of a noble character and frequently sublime.

While in the habitual criminal the impelling cause is usually of the weakest description, in this class of cases there is a veritable proportion between the cause and the crime. Such was the case with the women Camicia, Raffi, Harry, Rosalia Leoni, and Ardovino, in whom the incentive to murder was betrayed love, exposure to dis-

honor, and in some cases abuse, as with Leoni, whose lover after having made her a mother, accused her of having given herself to thirteen men. In Verani's case the cause was adultery detected in the act; with Orsini and Sand an intense patriotism and the hope of serving their country by killing a man whom they believed to be its worst enemy. In other cases the provocation consisted in some grave insult proffered in the presence of persons dear to them, hunger and poverty of their children, or a long-continued persecution of some beloved person (Rivière).

To these cases might be added those of political offenders and of infanticides, many of whom commit crime through an exaggerated idea of honor, the cause being the disgrace attached by society to illegitimate maternity. In delinquents from passion, the cause is not only grave, but recent; Bouley received the information which determined his crime a few hours previously; Bonnin, Bechis, and Verani a few minutes only. The letters of Curti which allude to his intense love for his victim are dated a few days previous to the crime; all this shows that the crime is never premeditated, or has been planned for a few hours at most. Moreover, the crimes are never committed secretly, nor by means of dissimulation, nor by the aid of accomplices, nor with weapons procured in advance. Whatever is at hand they seize, a stone, a pair of scissors, or they use their teeth, nails, and hands, especially in the cases in which women attack their rivals or their own new-born infants. In many cases the murder is committed in the most insane fashion, the murderer furiously striking right and left, as in the case of Marino, who seized a pair of shears, and killed not only his rival, but his mistress and his mother; and Grasso, who when hindered in his attempts at murder, killed his father, and then the oxen in the stable.

Accidental Criminals and Criminaloids.

The accidental criminal is not to my notion a true criminal, but a man like any other, whom the law arrests from necessity, but who is not really blameworthy, circumstances beyond his control having made him commit actions injurious to others, as, for example, letting fall from a height a weapon which wounds some one else, causing a fire by the throwing away of a lighted cigar, carelessness resulting in the collision of railway trains, the discharge of firearms supposed to be unloaded. These may be called pseudo-crimes, or judicial crimes, not natural ones, and should be punished only by a fine or a reprimand.

Criminaloids.—These must be carefully distinguished from the

previous class, because in them the occasion does not make the crime, but merely furnishes the opportunity for the manifestation of criminality. They are therefore congenital potential criminals who do not commit misdeeds unless special circumstances exist which determine them, but who cannot be called free from criminal tendencies, and for that reason cannot be accounted absolutely innocent. Among them we may include domestic thieves, pickpockets who inflict wounds, bankrupts, more or less voluntary accomplices in the crime of a husband or a wife, or of a master, those swept along by the fury of a mob, etc.

In such as these, the criminal type is found in only seventeen per cent. Certain characteristics, however, prevail, such as left-handedness in swindlers, a greater cranial capacity, diminished length and breadth of the face, lessened obtuseness of the sensorium; emotionality is preserved, and is greatest in swindlers; resisting power is diminished, for which reason they die easily; the intelligence is always keener and more active than in other criminals; there is delay in making up their minds to commit crimes, and uncertainty in carrying out the intention; some remorse, infrequency of association with criminals—at the most they go in couples. The causes which incite them to crime are weighty, as the hope of large sums of money to be gained; neuropathy is less frequent, alcoholism more so; these people more frequently confess their crimes.

Criminals from Habit.

These same "criminaloids," hardened and deteriorated by imprisonment and disgrace, and anæsthetized by alcohol, end by becoming criminals from habit, who, without possessing the external and neuropathic signs of born criminals, yet possess all their immoral tendencies. As Dostoïevski observes, the more timid they were at first the more do they delight in the horror which they cause, and the more obstinate do they show themselves in relapsing into crime.

Insane Criminals.

The statistics give us one lunatic to every twenty prisoners. There is a predominance of epilepsy, imbecility, idiocy, alcoholism, and melancholy, while paralysis is rare. I do not refer to the morally insane, for nearly all criminals belong to that category. The ones under discussion are nearly all insane previous to their imprisonment or became so during the first year; they are especially incendiaries, assassins, ravishers, and thieves, and men more commonly than women. Their characteristics are very similar to those of true

criminals, consisting in the frequency of degenerative and æsthetic stigmata, tattooing, and heredity taint, and many of them appear to be born delinquents, either by their physical and psychical characteristics, by their motions, their manner of executing crimes and of behavior after the crime is committed, or by simulation. But this is to be explained not only by the absence of moral sense and by the facility with which they succeed and perfect themselves in crime, but also by the fact that they are actually masked epileptics or born delinquents in whom melancholy and monomania seem to fasten themselves by a species of symbiosis, from a natural tendency possessed by psychical attributes to become implanted upon the degenerated soil. These special and characteristic signs render them conspicuous enough to attract our attention. We have already seen how in the hysterical, in alcoholics, and in cleptomaniacs we may have indications of transitory madness, nearly all the characteristics of epileptics, and (as in the latter) an exaggeration of moral insanity. So also here, where we would least expect it, in the "mattoid," whose lunacy has so long concealed itself behind an habitual calm, and by the absence of hereditary and degenerative characteristics, there suddenly appears this form, which we may say constitutes the nucleus of the criminal.

In many mattoid melancholics and monomaniacs, however, we notice movements and mannerisms quite different from those of either criminals or normal persons, they taking on a character of indecision due to the arrested or deviated association of ideas. They have a certain homogeneity shown by their impulsiveness, by their actions when under the influence of hallucinations, by the importance attributed to certain special words or to certain details, and a preference for symbols and special forms of writing, and in this they show a great difference to born criminals. From this point of view it is difficult to understand why several American specialists, as Crichton and Spitzka, can confound born criminals with paranoiacs, who among other differences frequently exhibit exaggerated altruism (the exact opposite of criminals) and rarely degenerative stigmata and a morbid heredity.

Although it is no longer possible to include all the criminal insane in one special class, yet one fact remains very evident—namely, the frequency with which epileptoid forms seem to prevail, thus imparting a certain appearance of uniformity to the disordered kingdom of the insane. We have seen that in the most extraordinary tendencies of sexual psychopathy their excessive, precocious, and intermittent manifestations, and the somatic and hereditary signs are epileptoid in character. In all those cases in which crime and madness seem to

be fused together in such a way as to make it impossible to distinguish between them, we can only treat them in the one way, and that is by sequestration, thus obtaining security against the great dangers to which the blind impulses of maniacs might expose a defenceless society.

Etiology of Crime.

An etiology may be found even for crime, just as for any disease, and perhaps with even greater facility.

Atmospheric Influences.—One of the indirect and external determining causes of crime, and the one least disputed, is atmospheric influence. Of chief importance is the action of heat.

From Guerry's statistics it appears that in England and in France the crimes of rape and murder prevail in the hot months, and Curcio has noted the same thing among Italians. According to Guerry the following is the proportion of crimes against the person at different seasons:

	In England.	In France.
In the winter	17.72	15.93
In the spring	26.20	26.00
In the summer	31.70	37.31
In the autumn	24.38	20.60

Of crimes against property we have a noteworthy predominance in the winter; for example, theft and forgery in January, with little difference in the other seasons. In this case the influence of the atmosphere is differently shown; it increases one's necessities and diminishes the possibilities of satisfying them. Finally, a perusal of Maury's curious study, based upon manuscripts of Guerry, would enable us to make, from the statistics of each single crime, veritable criminal calendars, in the same way that botanists make floral calendars. The influence of heat explains why in southern regions, as in France and Italy, the crimes committed against the person are so much more frequent than in northern and central latitudes; to this subject we shall return when treating of the peasantry and of brigands.

While in general out of every four hundred inhabitants in Italy we find one delinquent, those committing crimes against the person and against property are distributed as follows:

	Against the Person.	Against Property.
Northern part	1 to 5,179 inhabitants.	1 to 1,641 inhabitants.
Central "	1 " 2,129 "	1 " 1,275 "
Meridian "	1 " 849 "	1 " 950 "
Insular "	1 " 838 "	1 " 777 "

In the northern part of Italy, a greater number of crimes against the person is found in Liguria than in the other regions, simply because the climate is milder.

Guerry demonstrated that in France crimes against the person are twice as numerous (4.9) in the south as in the central portion (2.7) or in the north (2.8). On the other hand, crimes against property in the north are 4.9 and in the south and central portion 2.3.

Influence of Race.—In India we find the Zacka-Kail tribe, which makes a profession of robbery, to which the new-born male infants are consecrated by making them pass through an opening prepared in the walls of their houses, singing to them three times, "You are a thief." Among the Arabs (Bedouins) there are tribes which are honest and industrious, but there are many which are parasitic and famous for their love of adventure, their reckless courage, their need of constant change, their lack of steady occupation, and their thievish tendencies. These facts suggest to us that race must to some degree influence crime. Yet among uncivilized peoples the documentary evidences of this are but few and non-convincing.

Throughout Italy, in nearly every province, we find villages which are known as having supplied an uninterrupted series of special criminals.

The gypsies represent an entire race of delinquents, with all the passions and vices of that class. According to Greelman they have a horror of anything requiring the least exertion; they will endure hunger and privation rather than subject themselves to easy but continuous work, and will do only what is absolutely necessary to keep themselves alive; their word is not to be trusted even among themselves. In an outburst of choleric rage, they have been known to catch up their own children and hurl them as if from a sling at their adversaries. Like delinquents, they are vain, and yet have no fear of disgrace. Whatever they earn is spent on alcohol and clothes, and they may be seen walking about with bare feet but with lace-trimmed and flashy clothes, or stockingless but with yellow boots. Lovers of revels and brawls, they make a great clamor at the market places; they assassinate for gain without scruple or remorse, and in the past they have been suspected of cannibalism. The women are the more clever at stealing, and educate their children in the art; they poison cattle, either that they may claim the merit of a subsequent cure, or that they may obtain the flesh at a low price.

Civilization and Barbarism.—Among the numerous social problems which await solution there is one of especial importance, and that is the influence of civilization upon crime and lunacy. If we trust to figures alone, the problem would seem to have been solved, for they

show an increase in the number of both criminals and the insane with nearly every year that passes. This increase is out of proportion to that of the population, but it may perhaps be explained by an increase in vigilance in the detection of these conditions.

One fact appears to be established, and that is that civilization possesses what Messadaglia well calls a specific criminality, barbarism also possessing its own type. The latter, by blunting the moral sensibilities, lessening the horror for murder (which is often admired as an act of heroism), and considering vengeance as a duty and might as right, increases the number of bloody crimes and the association of malefactors. Civilization, thanks to the railways, and to bureaucratic and commercial concentration, etc., tends increasingly to enlarge the great centres, and to crowd the capitals. As is well known, it is in these that the greater number of habitual criminals congregate.

Whoever has made a study of man and of his varying actions in the midst of social groups of whatsoever nature, will have noticed how frequently he undergoes a transformation there, and from having been and still being honest and chaste, when alone or in the domestic circle, becomes licentious and finally immoral in certain surroundings. How often it happens that a man in a club or assembly, met for whatsoever purpose, has allowed a friend or a master to be insulted in his presence without taking offence. For this reason, everything that increases the relations and the associations of human beings increases the number, if not the gravity, of crimes. Civilization increases some crimes as well as some forms of insanity (paralysis, alcoholism), because it increases the use of excitants almost unknown among savages, but which have become a necessity in more civilized countries. So much is this the case that in England and America there is increasing abuse of alcohol, opium, and even ether, and the consumption of brandy in France from the years 1840 to 1870 rose from eight pounds a year to thirty.

Food.—One of the factors which complicates almost inextricably the influences of climate, race, and civilization is that of alimentation.

We have seen that with the progress of civilization, crimes of lust have progressively increased in both France and Prussia. But a comparison of the yearly statistics of crime in Germany with the current prices of indispensable foods will show us that alimentation has as much to do with the matter as, and perhaps more than civilization, because with wheat at a low price crimes against property diminish, while those against the person increase, rape especially. In Prussia, in 1862, when the price of potatoes, etc., was very high, crimes against property were in the proportion of 44.39, and those

against the person of 15.8; when the price of these food-stuffs diminished, the former became lowered to 41, and the latter increased to 18. The famine of 1847 raised the average of crimes against property in France to 24 per cent., while those against the person were only 1.6. Famine depresses sexual instincts, abundance stimulates them; and while the former incites to theft to satisfy alimentary necessities, the latter, by rendering hunger less keen, reduces this crime.

Alcohol.—The alimentary substance whose action has been most thoroughly demonstrated is alcohol, the homologues of which are hashish and opium. These substances whose action is to stimulate the brain abnormally besides causing diseases many of which are incurable, such as paralysis, induce even more frequently a tendency to crime and to suicide. Not only opium eaters, but alcoholics are immoral in their habits, and beget children who are either insane, or delinquents, or precociously lustful, as we shall presently see demonstrated by the history of the Juke family.

Locatelli speaks of a workman of thirty years who when in the fury caused by drink struck at and smashed everything that came to hand, often endangering the lives of his saloon companions. I myself once knew an Italian officer who twice when drunk ran his sword through persons unknown to him, one of them being the sentinel of his quarters. According to the Boston inspector of prisons, seven-tenths of the prisoners were such in consequence of drunkenness; the figures run up to nine-tenths in the Albany statistics. Bertrand states that out of every hundred of English criminals five or six are drunkards.

Heredity.—According to official statistics, out of 2,800 criminals under age, in 1871 and 1872, 7.4 per cent. were of drunken parentage; the fathers were in the proportion of 5.3 per cent., the mothers 1.7, and both together 0.4.

These figures are sufficient to show us how great is the influence of heredity in crime. Not only does alcoholism in the parents favor crime in the children, but, as is natural and as indeed we should expect to be even more the case than is shown by statistics, criminality in the parents becomes hereditary.

Virgilio found a criminal parentage in the proportion of 26.80 per cent., chiefly, as in the case of alcoholism, on the paternal side (21.77), without counting 6 per cent. of indirect heredity. Out of 3,580 criminals under age of Mettray, 707 were the children of prisoners, 308 of persons living in concubinage. Italian official statistics gave among minors, in 1871–72, 3 per cent. of convict parentage. Here also the father represents a worse influence (2.4) than the mother (0.5 per cent.), which may be explained by the at least apparently smaller

amount of criminality among women. The same statistics also show us that 28 per cent. of the families of these criminals under age were of doubtful reputation and 26 per cent. of bad, a proportion recently exactly reproduced by Virgilio. It was noted, especially in insular districts, that in the case of females the number of relatives of doubtful or immoral reputation was more than double that of males. The brutal Galetto di Marsiglia was a nephew of Orsolano, a cannibal and ravisher; Dumollard was the son of an assassin; Patetot's grandfather and great-grandfather were assassins; Papa, Crocco, and Serravalle all had grandfathers in prison, and Cavallante both father and grandfather.

The famous woman thief, San Refus, was the daughter of a thief, Comtois, who died in 1788 on the rack, and of the female thief Lempave. The most important proof of the heredity of crime and of its relations to mental disease and to prostitution is given by the recent interesting researches of Dugdale concerning the Juke family, whose name in America has become synonymous with crime. The first of this disgraceful family was a certain Max Juke, a hunter and fisherman, a drinker and libertine, who late in life became blind; he was born about 1720, and when he died, left behind him 540 legitimate and 169 illegitimate descendants. The following table will show the singular connection existing between prostitution, crime, and disease, as they all proceed from the same hereditary cause.

MAX.

77 criminals.	128 prostitutes.	131 impotents, idiots, or syphilitics.
142 vagabonds.	18 brothel keepers.	
	91 parents of illegitimate children.	40 sterile.

With strange progressiveness, the delinquents, who are scarcely represented in the second generation, increase to 29 in the fourth, to 60 in the fifth, just as prostitutes from 14 increase to 35 and 80 and vagabonds from 11 to 56 and 74, with no falling-off in the sixth and seventh, except that nature, provident in crime as in the case of monstrosities, brought matters to an end by sterility in the mothers, which from 9 in the third generation increases to 22 in the fifth, and by early death in the children, which reaches to 300 in the later years.

Heredity of Madness.—As has been proved by this gloomy genealogy and a similar one of Matgau, a certain number of the relatives of criminals are afflicted with mental aberration. Out of 314 cases I have found 7 whose fathers were insane, 2 whose fathers were epilep-

tic; 3 had each a brother, 4 a mother, 4 some uncles, 1 a cousin, 2 a father and two uncles who were cretins; one had a brother and one a father who were subject to convulsions, and 2 whose fathers were drunkards.

Gottin, who set fire to his benefactor's house, had an insane uncle; in the case of Mio, it was the grandfather and the father; of Giovanni di Agozolo, a parricide, the brothers; of Costa and Militella the uncles and grandfather; the sister of Martinati was a cretin; Vizzocaro the parricide and fratricide, and Palmerini the assassin had insane uncles and brothers; Bussi's father and mother were mad, and Teresa, Abbado, and Kullmann had insane relatives.

Age.—The influence of age upon crime has been recognized by all statisticians, and is one of the few marks of distinction between it and insanity. An examination of the following table, based upon an almost equal number of lunatics, criminals, and normal individuals, will show that the number of criminals is greatest between twenty and thirty years, the age at which the number of the normal is least, as also that of the insane, who are found in the greatest number between thirty and forty.

Age.	Italians.			English.	Austrians.
	Of 20,011 Normal.	Of 20,011 Insane.	Of 26,590 Criminals.	Of 23,768 Criminals.	Of 12,786 Criminals.
From birth to 20 years.....	43.55	6.18	12.9	25.10	10.4
20 to 30.....	17.01	2.34	45.7	42.40	42.6
30 to 40.....	14.32	26.21	28.8	16.80	27.07
40 to 50.....	10.67	22.91	11.6	8.40	12.1
50 to 60.....	7.89	14.02	3.8	4.20	5.9
Over 60.....	6.56	9.34	0.9	2.0	1.24

While the insane after the age of forty are about twice as numerous as the sane and as criminals, the last named, after forty years even diminish in number; and from fifty on both diminish by about one-half. At the end of early youth there is a sort of instinctive tendency towards crime which among immature minds is taken as a proof of virility. This fact is well expressed by Manzoni in his romance: "It seemed to Gervaso that he had become a man like other men because he had stretched out his hand to a thing which smacked of criminality." This is also substantiated by the Sicilian word *omertà*, which has the double meaning of virility and robbery. Each age has its own special crimes as has been well shown by Quetelet, Guerry, and Messadaglia. Youth and old age, in Austria, showed the largest proportion of libertinage (thirty-three per cent.); Guerry points out that the maximum of libertinage is found from sixteen to

twenty-five years, and from sixty-five to seventy. In England, the largest number of crimes against nature is between fifty and sixty years. In this case, it is certainly evident to those who are aware that senile dementia and paralysis, which usually do not come on until after the age of fifty, are often accompanied by the delirium of satyriasis, that in many cases insanity has been mistaken for crime.

Another criminal tendency of youth is towards incendiarism (30.8 in Austria, according to Messadaglia). Here also the suggestion occurs to the mind that mania in those who have not reached puberty assumes with singular persistency the form of pyromania; the same might be said of theft. But Quetelet calls attention to the fact that, although the tendency to thievishness is one of the first to manifest itself, it is common to all ages, and may in some form or another extend throughout life.

During adult life homicide, infanticide, induced abortions, and rape predominate in the proportion of seventy-eight to eighty-two per cent. (Austria). With maturity we have an increase in calumnies, swindling, unfaithfulness, extortion, assistance rendered to criminals, and libertinage. In old age, in addition to the last tendency, we find help given to criminals, infidelity, swindling (another analogy to youth), a tendency to incendiarism and to the theft of objects confided to one's care.

To give an idea of the distribution of crime according to age, we submit the following table of the number of those accused and condemned, per thousand inhabitants, in France from 1826 to 1840.

Age.	Theft.	Rape.	Wounds.	Murder.	Homicide.	Poisoning.	Swindling.	Calumny.	Total.
Under 16 years	0.4	0.1	0.1	0.2	0.1	0.3	0.1	0.1	0.3
From 16 to 21	16.0	14.1	10.9	7.3	6.0	3.4	3.8	4.6	12.2
21 to 25	18.4	14.3	13.5	15.3	14.2	9.5	10.1	9.1	15.8
25 to 30	14.7	12.6	20.1	16.6	14.1	13.9	11.8	8.8	14.6
30 to 35	13.7	11.1	16.7	14.0	15.3	12.2	13.4	11.0	13.3
35 to 40	10.7	8.8	11.8	11.1	10.8	11.2	12.8	11.7	10.8
40 to 45	6.6	7.5	6.8	8.3	9.7	13.0	11.5	11.0	8.9
45 to 50	6.4	6.4	6.8	7.3	8.2	9.4	9.7	10.0	7.0
50 to 55	4.5	4.1	4.7	5.8	6.3	6.5	7.6	9.3	5.1
55 to 60	3.1	4.4	3.3	4.5	5.2	4.8	5.5	8.3	3.9
60 to 65	2.6	4.8	2.9	4.0	4.3	4.8	5.4	6.9	3.4
65 to 70	1.8	5.2	1.6	3.0	3.2	5.1	3.9	5.4	2.5
70 to 75	1.2	4.5	0.8	1.7	0.7	3.0	3.0	3.8	1.6
Above 80	0.4	2.1	0.5	0.9	1.6	3.8	1.4	....	0.6

Sex.—All statistics agree in demonstrating the rarity of crime among women as compared with men. Were the many cases referred to previously by us, and indirectly shown in statistics, where

there were palliative circumstances, taken into account, and infanticides excluded from the list of habitual criminals, the proportion would be even less. In Austria, the women criminals do not reach 14 per cent. of the total number; in Spain we have 11 per cent., in Italy 8 per cent.

Although this may be correct for grave crimes, it seems to me that the statistics are misleading in one way, for prostitutes should be counted in with criminals, and in this case the number would be equalized, or the weaker sex might even be in the majority. According to Ryan and Talbot, in London there is 1 prostitute for every 7 women, and in Hamburg 1 for every 9. In Italy there are 9,000 recognized prostitutes, and in the large centres, 18 or even 33 per thousand inhabitants. These figures are often doubled or increase tenfold in some countries. In Berlin there were 600 in 1845, and 9,653 in 1863. Du Camp calculates that clandestine prostitutes are about 120,000 in Paris at the present time.

An eminent statistician wrote: "Prostitution is to women what crime is to men." This sentiment is repeated, and better yet, proved by Dugdale in the genealogy of the Jukes. It, as well as crime, is caused by poverty and by laziness, but above all by alcoholism, heredity, and special physical tendencies. We have seen, and we shall receive further proof of the fact, that the same physical and moral characteristics as in delinquents are found in prostitutes, and that a great sympathy exists between the two classes.

Even legally and statistically a certain number of prostitutes are counted as criminals. Guerry noted that in London prostitutes up to the age of thirty became criminals in the proportion of about 80 per cent., and above the age of thirty about 7 per cent. And just as in the case of prostitution, so also criminality increases in women in proportion to the increase of civilization, and tends to become equal to that of men. In London, in the year 1834, there were 18.8 women criminals to every 100 males; in 1853 there were 25.7. In Spain the number given is 11, in France 20, in Prussia 22, in England 23. In Austria, while the total of criminality in women is 14 per cent., in the capital it reaches 25 per cent., and in Silesia 26.

Women by nature possess a specific criminality of a different kind from that of men; in the empire of Austria (Messadaglia) they more often commit abortion, bigamy, calumny, the giving of assistance to criminals (7.28), incendiarism, theft (24 to 18); more rarely murder and forgery. In France the crimes most predominant among them are infanticide (94), abortion (75), poisoning (45), the murder of relatives and the maltreatment of children (50), domestic theft (40), incendiarism (30). In England they are in increasing

numbers given to counterfeiting, perjury, calumniating, and to a slight extent murder.

Occupations.—The occupations which are carried on in cities, and which expose the most to the temptations of alcohol (cooks, shoemakers, innkeepers), which bring the poor into too close association with the rich (waiters, servants), which from their nature are able to make the commission of crimes easier (masons, ironmongers), contribute a notable quota to delinquency and give the most recidivists (cooks and shoemakers, six to twenty).

Occupations which expose to less contact with the rich, as those of boatmen and peasants, give the minimum of delinquents, and the minimum of relapses (Carcaiuoli).

Fayet, however, noted that the greatest number of parricides, one hundred and eight to one hundred and sixty-four of the total, were found among the peasants. He found a great number of crimes against purity among masons and painters; rape among drivers, infanticide among milliners and workers in laundries (women being in the majority in these two occupations). Among commercial men, offences against property are the most frequent. This class of crime is especially prevalent in the middle classes, and is unfortunately on the increase, especially among notaries and lawyers, being less frequent in landowners.

Rating the criminality of men during the last twenty-six years at 100, the specific criminality of priests, according to Fayet, is 10; attorneys, 52; advocates, 74; notaries, 145; porters, 162. The notaries and porters were in greater proportion than the others of the same age and sex; double that of the advocates, three times that of the attorneys. Professional men form one-seventh of the murderers, one-sixteenth of the parricides, one-eighth of the ravishers of girls under fifteen years, one-thirteenth of those committing crimes against the person, and one-eighteenth of the total number committing other crimes.

Education.—The amount to which education is a factor in crime has already been demonstrated by the statistics submitted, which demonstrated the action of heredity. The proportion is still further augmented in civilized nations, and in modern times by the number of criminals who are of illegitimate birth.

In Prussia the number of illegitimate delinquents, which in 1858 formed 3 per cent. of the total, has risen to 6 per cent. In France of the 8,006 minors arrested in 1864, 65 per cent. were bastards or orphans, and 38 per cent. the children of prostitutes or criminals. In 1873 the illegitimate delinquents were in the ascendant; the males at the rate of 10 and the women of 21 per cent. In Hamburg, 30

per cent. of the prostitutes were illegitimate; and in Paris one-fifth of the inhabitants of cities, one-eighth of the country people were bastards. In New York in one year 534 natural children and 222 foundlings were arrested.

We may add that 36 per cent. of the recidivists are natural children and foundlings. Every one will have noticed how many of the members of the Camorra of Naples are named Esposito, and how many of the highwaymen of Lombardy and Bologna are called Colombo; these are the surnames which it is usual to give to foundlings.

In Italy the prison statistics give us from 3 to 5 per cent. of illegitimate males under age, 7 to 9 per cent. of females. In order to further establish this fact, I made personal and thorough researches relating to 3,787 inmates, nearly all adults, of the insane asylums at Imola (Dr. Lolli), at Padua (Professor Tobaldi), and at Pavia, and to 1,059 inmates of the City Hospital of Pavia in 1871, and found among the first a proportion of 1.5 per cent. of foundlings, and 2.7 per cent. in the second. And yet the mortality among the illegitimates of Pavia is less than in many other places. At the same age and under the same conditions, therefore, foundlings would give us many more criminals than insane.

We may therefore positively assert that a large proportion of the foundlings who escape death become criminals. The influence of heredity may play a large part, as well as the difficulty experienced in finding the means of existence, but their deserted condition is the most important factor of all. With no name to uphold, with no one to restrain them in the indulgence of their passions, without any one to develop their nobler instincts and curb the savage instincts of their nature by painstaking care and solicitude and by affectionate self-sacrifice, the lower instincts easily take the ascendant.

An education in crime is of course even more influential than desertion. How can the unfortunate lad defend himself against the power of evil, when it is depicted to him in rosy color, or worse yet, forced upon him by the authority of his relatives or teachers?

The family Cornu was composed of assassins and thieves who were educated in crime by their parents from earliest infancy. Of five brothers and sisters only one showed a great aversion to crime. This was the youngest girl, who was, however, initiated in it by being forced to carry in her apron for two leagues the head of a man murdered by the family. In a short while she was so completely hardened as to have become the most ferocious of the band, to the extent of wishing to torture travellers in the most cruel manner.

Impressions and Imitation.—Another frequent cause of crime is the influence of a given sensory impression, as the sight of some gold

object, the reading of immoral books, newspapers, etc. In these cases a disordered brain has a large part, but the chief factor in both crime and insanity is imitativeness. In 1868 and 1872 no sooner had the journals begun to speak of the desertion of some children in Marseilles than the crime was repeated to the extent of eight in one day (Despine). In 1851 a woman in New York killed her husband, and a few days later three other women did the same thing.

Emigration.—Of not less influence upon crime is emigration. The emigrant is the type of that species of humanity which has the most incentive to, and the greatest facilities for, the commission of crime; greater necessities than others, less surveillance, less sense of shame, better facilities for escaping punishment, and the use of a jargon; thieves are nearly always nomads. In New York the largest contingency of the criminal classes is derived from the emigrants.

The expression *mariuolo* (swindler) certainly originated with the pilgrims of Loretto and of Assisi, whose custom it was to cry in chorus "Viva Maria," while committing acts of lust or theft, which they expected to expiate by their pilgrimage.

Therapeutics of Crime.

Instead of attempting to cure crime when the delinquent has already reached adult life, we should aim at preventing it, by lessening (their complete annihilation being an impossibility) the causative influences previously enumerated.

Measures against the Effects of Climate.—Although we cannot entirely prevent the injurious effect of hot climates, we may endeavor so to regulate the laws in hot countries as to modify this action; for instance, we may legislate in regard to prostitution in such a way as to lessen the effects of sexual excesses; make the punitive laws more forcible and of a character to more strongly impress the mind; being careful not to allow ourselves to be so influenced by pedants and visionaries as to enforce in southern climates the same laws that apply to northern climates, especially in matters which concern crimes against the person. We can also modify the injurious action of heat by the facilitation of cold bathing on a large scale.

Measures against the Effects of Barbarism.—Barbarism cannot be made to disappear at once, but much may be done to lessen its evil effects, by thinning out the forests which are the natural refuge of malefactors; by the opening out of new roads; the founding of cities and villages in the most ill-famed localities, as was successfully done by Luitprand, King of the Lombards, in 734, for example; by taking away all arms; by rapid and energetic repressive action, which will

prevent or lessen the arrogance of the strong and of the rich, and the resulting vengeance of the weak, a major cause of brigandage; by diminishing superstition and prejudices through educational influences, or, as Garibaldi and Napoleon often endeavored to do, by directing these superstitions against crime; by the abolition of certain institutions which are of no especial use even in cultivated nations, such as the jury system, the popular election of judges, etc., by the surveillance and regulation of emigration; by vigilance in arresting receivers of stolen goods, with their relations and companions, who have been shown to be the starting-point and constant support of associated criminals; by the encouragement, or, if necessary, the terrorizing of honest but weak citizens, so that, placed between the two opposing fears of brigandage and of the law, they will be constrained to prefer the latter to the former, a method by which Manthès broke up bands aggregating four thousand brigands in a little less than four months.

Civilization.—A practical institution is that of the Americans, who have formed burglar insurance companies. They so arrange an electric alarm that the entrance of a thief is signalled to the nearest office of the company, and an officer is despatched thence at once, and catches the thief red-handed.

In Austria and in England detectives and *Vertraute* have been introduced, who are the true *bersaglieri* (Italian sharpshooters) of criminals. Photography, the telephone, especially when applied to railway carriages, and the railways themselves are so many modern methods for neutralizing the new instruments of crime introduced by civilization. Quite recently, in Germany, they have started the custom of publishing on the last page of the most widely circulated newspapers descriptions and even photographs of those criminals whose arrest is of the most importance. In this way the press, and especially the last page, which until now has so frequently been used for the promotion of vengeance, calumnies, and swindles, is becoming a weapon of defence for society. Another preventive measure against crime is that suggested by Despine, the sequestration of habitual criminals, who when at liberty boast of the commission of crime, it being well known that they will keep their word only too well.

To diminish that prolific cause of crime in the large cities, the use of alcohol, it will be well to put on a high tax, which would certainly be a more moral and sound measure than the taxation of salt, for example; and as Luzzati suggested, to lessen the number of holidays, which are just so many opportunities for orgies and brawls.

In certain cantons of Switzerland the name of an habitual drunk-

ard is posted by the police in all inns, and the proprietors are forbidden to receive or entertain him.

In Sweden, where alcoholism had become an endemic disease, the tax upon the distillation of brandy was by successive laws in the years 1855-56-64 raised from 40 cents to $5.40 and $6.40 a hectolitre (26.4 U. S. gallons); the use of steam in distilleries was forbidden; the daily output was limited to 2,610 litres a day, and distillation was permitted for only two months in the year. Later this was extended to seven, but only in the large distilleries, in order to crush out the smaller ones which are more injurious to the lower classes; from 35,100 they were reduced to 4,091; the production of alcohol diminished by two-thirds in ten years, and its price rose from 10 cents to 26 cents a litre. It is a noteworthy fact that grave crimes from 1851 to 1857 diminished in the proportion of 40 per cent., and smaller crimes in the proportion of 30 per cent., and that the diminution continues, there having been 40,621 in 1865 and 25,277 in 1868.

But of even greater use than high taxation will it be to lay the axe at the root of the evil (the need experienced by uncivilized man of stimulating his brain) by the substitution of more healthful and better forms of stimulation for that of alcohol, as do the English with their tea-rooms and cheap entertainments. Most useful also will be the education of the masses, not only in a knowledge of the alphabet, but in the higher feelings and views, especial emphasis being laid upon industry and a horror of laziness as the foundation of crime. It is not sufficient to have suppressed the public execution of the death penalty; the much more dangerous publicity of trials before tribunals and courts of assizes, which are frequented by rogues for instruction in crime, should also be suppressed.

The state should establish settlements for work at a distance from the large centres of population, and more particularly agricultural colonies in those parts of the country which are the least advanced in the knowledge of this branch of industry and the most in need of workers, and should send there for a stated term all those arrested for idleness and vagabondage, subjecting them to the same strict police surveillance as are those condemned to the prisons.

Children's Assemblies.—Among reunions the ones which seem the least to be feared, and yet which require the most watching, are those gatherings of children in the public squares and streets of large cities which attract a large part of the vagabond and idle youth.

Reformatories.—In connection with the last subject, the suggestion at once arises of reformatories, houses for the detention of the young; these shelter in France 7,685, in Italy 3,770, in Holland 161, in America 2,400. The utility of these institutions is, however, only

apparent, the evil is substantial. Everything which increases personal intercourse among criminals tends also to increase crime. Especially is this the case at that age which is not young enough to be influenced by correction and precept, but is the most expansive, the most inclined to imitation, especially the imitation of evil to which it naturally gravitates from the possession of violent passions and deficient education and judgment. It is not impossible that the removal of the restraining influence of family ties plays a part in the matter.

In the model reformatory of Italy, which is the one in Milan, there are only ten per cent. of recidivists; about one-third of those sent out from the institution, however, do not enter into the calculation, either because they have been put in other institutions or because their whereabouts are unknown, and this, of course, invests the figures with some degree of uncertainty. Moreover, the investigations have been confined to a period of only three years after departure from the institution. Who can tell what happens later, especially as d'Olivecrona tells us that relapses are much more frequent after the third year after dismissal.

In the many reformatories of America they estimate the number of recidivists at thirty-three per cent. Even De Tocqueville, after praising these institutions as the ideal of penal reform, states that out of five hundred and nineteen children, three hundred relapse; nearly all who do so are those addicted to theft, especially the girls.

It may be added that the possibility of having their children put into an institution the moment that they become unmanageable, without any particular trouble to themselves, has the effect of making the parents less vigilant in the exercise of their duties, and perhaps even induces some to foster their evil-doing.

As for the children abandoned by their parents in large cities, and for orphans, it is a delusion to think that reformatories will save them from evil associations. Although they do escape those of vagabondage, their companions, who are either entirely corrupt or on the way to become so, are a source of a far worse contamination, of concentrated vice, which has been passed through the sieve of penal selection, so to speak, and to this contamination they are exposed at the very age when there is the strongest inclination to vice. Although in some of the best reformatories, where the discipline was temperate and rational, I have met youths with frank, bright faces, and of unusual industry, I cannot say the same of many others, where the tranquillity was only an apparent one, and where the mildness of the rule was a mere varnish which covered vices worse than the primary ones.

It is impossible for me to approve of reformatories except those where (as in Elmira) a few individuals are taken in, divided into classes, according to age, habits, ability, and morality, and, for the night at least, put into cells. I would have only such boys placed there as poverty prevented from being placed in military schools or in the navy, but if no such distinction were made, then I would have well-to-do parents pay a daily sum in proportion to their means.

How, then, shall the large number of orphans and deserted children be provided for? Free asylums and industrial schools should be substituted for prisons and reformatories.

American Reforms; Settlements in the Country.—In 1855 there was established a society of relief for vagabond children (Children's Aid Society). The attempt was made at first to place them in shops, but competition with non-philanthropic shops prevented their success, and the young offenders felt a desided repugnance to being objects of charity; they were fond of an outdoor life, and ran away. Then the idea was conceived of offering them lodgings at nominal prices, as a bed for six cents, bath and dinner for four cents. With all this, however, no means could be devised to make them work; to ask them to do so, in so many words, would have been to depopulate the new lodgings at once. In order to overcome the general repugnance to work, and to disarm all suspicion, the manager one morning announced that a gentleman had been there in search of a boy to work in his bank, where he would give him twelve dollars a month. Twenty boys at once raised their voices to offer their services. "Yes, but he will need to write a beautiful hand." General silence. "Well, if there is no one here who knows how to write well, we will give you lessons in the evening," and this was the beginning of the evening schools.

In 1869–70, 8,835 boys had been in the lodgings; in ten years 91,326, of whom 7,788 had been placed at work. Their instruction was completed by placing them on farms, where their work was more productive and therefore preferable, and where they were away from the evil influences of the large and even the small centres. Many of these children were adopted by their masters, others by their industry have started other farms, have become professional men, even clergymen, and many of the women are good mothers of families. This society in thirty-three years accomplished the following results: places were found for 35,000 abandoned and homeless boys, in addition to the large number (23,000 in 1875) who were received into the industrial schools, of which 21 are day and 14 night schools, where they are fed and clothed, and in the 6 lodging-houses. In New York, in ten years after the establishment of this institution, vagabonds di-

minished from 2,829 to 994, thieves from 1,948 to 245, and pickpockets from 465 to 313.

Day Reformatories for Children.—When, as in our own country, the idea of self-governed, spontaneous, philanthropic institutions is too new a one to be received, we may give attention to another institution which is more easily obtainable, the one which Padre Spagliardi called a day reformatory for children. It is an obligatory institution, but only a day one, for children between six and twelve years of age, who cannot be received in the ordinary asylums, and who from their own disinclination or the poverty or incapacity of their parents are destitute of all the means of education, and also a place where the young ragamuffins of the street are forced to go.

One great cause of criminality would be corrected by this means in the children of respectable persons (no less than twenty per cent. are criminals from this cause), namely, the weakening of parental authority, the absence of that resistance to irrational desires which is given by a sense of justice, honesty, and by discretion. This might be obtained without separating the boy from his home and liberty at an age when he stands most in need of air and motion, above all from the care of and intercourse with his mother and family, which when once broken off is never resumed.

This institution would also render more practicable, and do away with the injustice of applying the law with equal force to a child of eight years and a youth of sixteen, and would do away with all appearance of condemnation, which is always degrading and harmful. In this way we should avoid the melancholy, frequently leading to suicide, so prevalent among the children in reformatories.

Ragged Schools.—This form of institution stands halfway between the obligatory asylum of Spagliardi and the voluntary one of Bari. The home for little boys is a whole village or colony dedicated to unfortunate boys, where they are placed in groups as in actual families, and learn to be shoemakers, waiters, mechanics, and farmers. Better yet is the Ragged School, where clothing, education, a little food, shelter for the day, and in some cases for the night, are given to poor boys abandoned in the streets, and to orphans. This institution, which costs the Government nothing, was started in London, in 1818, with a few vagabonds gathered in from the streets; in 1869 there were no less than 23,498 of these places (with 3,897,000 beneficiaries) scattered in the poorest quarters, and, classified according to the various industries. They form a noble link between the upper and the lower classes; in one of them a chancellor of England taught a class in the Sunday-school for thirty-four consecutive years. Some of the children enter these schools voluntarily, and

some are placed there by the police; not a few are self-supporting, as, for instance, in 1860 there were 368 bootblacks who every day brought money which they earned to the society. A measure worthy of imitation is this, that when the children have become delinquents through the negligence of their parents, the latter are obliged to contribute a penny out of each shilling of their earnings towards the expenses of their detention; this, of course, makes it to their interest to keep them at home, and does not, as in our own country, make it almost an advantage to them to have the children taken away.

Penalties Outside of Prisons.—It is our endeavor, so far as possible, and so far as we can reconcile it with our state of civilization and our not always advantageous delicacy of sentiment, to substitute for the prison certain physical punishments, which are the only ones capable of gradation, such as fasting, the douche (in England and Norway they have recently reëstablished whipping for young criminals, and Tissot recommends it because it is not expensive and may be graduated), forced labor, sequestration at home under surveillance by the police, banishment and fines which after corporal punishment is the one that is the most complete, and can most perfectly be graduated, and which by being raised to large amounts to be effective in cases in which the criminals are wealthy, would contribute to the lessening of the enormous legal expenses incurred; it would also hit the modern culprit in his most sensitive spot, the very point which most often drives him into crime, and might perhaps end by being a preventive measure, since, as we have seen, the greatest number of criminals who are recruited from among the ranks of the well-to-do and the professional classes take to crime from motives of gain.

Prison Cells.—If the crime be of so serious a nature that imprisonment must be the punishment, we should as far as possible avoid all chance of intercourse between the prisoners. This is the reason for the prison cell, which, while it certainly does not reform the prisoner, does not further confirm him in crime, and does, in great measure, cut him off from evil associates.

The Application of Psychology to Prison Discipline.—When our aim is to go beyond mere punishment and to make the prison a place of reform, solitary confinement, at least during the daytime hours, will not be advisable. Sermons and lessons upon abstract morality are useless; we shall have to arouse their interest in goodness either by means of material advantages, such as the gradual diminution of their punishment, or by appealing to their vanity. For this reason the best results have been obtained by establishing marks of merit or of blame in a mark book; or by passing the prisoners on to a higher and more privileged class when they deserve the promotion. More-

over, as Despine well observes, we must endeavor to raise the criminal in his own eyes, make him understand that he can reacquire the esteem of others, and inspire him with the necessity of becoming honest by means of those same passions which when left uncontrolled would drag him still farther downhill. Ferrus tells of a thief who became an honest man simply from the fact that the prison sister of charity purposely trusted him with the care of the wardrobe. A certain idle prisoner was insupportably violent; he was appointed to watch over a group of fellow prisoners and became the most docile of all.

Work should be the mainspring, the pastime, and the object of every prison, to arouse the slumbering energies, to give the habit of occupation which will be of such use when the prisoners obtain their freedom, to serve as a means of prison discipline, and also to make up for the expenses incurred.

The Graded System.—By this time we are able to understand the advantage of the Irish system—of conditional, graded steps towards liberty. We greet these institutions as a decided step in advance, but we must not allow ourselves to suffer any illusion upon the subject. We must remember that many of the advantages claimed for it were in Ireland the result of emigration, because the liberated prisoners, not being able to find work, went to America, where they filled the penitentiaries of New York. Also that even with this system there were many relapses in Denmark and more still in England, where it would appear that these freed prisoners changed, not their habits, but merely their place of residence, in spite of the laws betaking themselves to places where they were unknown, and there working evil not directly, but by making other scoundrels work in their stead. According to Davis, the chaplain of Newgate, nearly all the garroters were of this type. A certain sheriff tells of judgment having to be passed on some ticket-of-leave men, who were condemned a second time, again let out on leave, and sentenced for the third time, and all this before the term of the first sentence had expired. One criminal in especial, in thirty-six years, had received sentences which amounted to more than forty years, and was at liberty. This is the reason why in England the number of prisoners out on ticket-of-leave, which in 1856 was 2,892, fell suddenly to 922 in 1857, to 912 in 1858, to 252 in 1859, and never went beyond 1,400, which it reached in 1861–62–63. The law in regard to ticket-of-leave men destroys all the advantages of liberation from prison, by substituting for real freedom the surveillance and warnings which we know by experience to be so illusory and so hateful.

Establishments for Incorrigibles.—It is evident that even the best system of imprisonment does not prevent relapses into crime, and

yet we must in some way provide for the interminable series of constant recidivists who continue to reappear under every form of penal government. It is my belief that for these cases we should establish appropriate places to which a jury composed of prison directors and physicians, judges, and citizens, should commit all those who from childhood have shown a tendency to crime, and have relapsed several times, especially if they are without family ties, or if their families are immoral, and if they themselves present those psychical and physical characteristics which we have seen belong to the habitual criminal. These unfortunate beings should be governed by a discipline less rigid than that of the ordinary penitentiaries, and might perhaps be kept upon islands where they could devote themselves to out-door occupations which have been found to be so beneficial to their health and to the state; better yet, they might, as in Sweden, be kept in squadrons and under military discipline, and be utilized in the repairing of roads or the reclaiming of marshes which is so much needed in Italy especially, and in the doing of which so many honest lives have been sacrificed.

The system of confinement in cells, from whose emendatory influence little could be expected under these circumstances, should not be resorted to except in the case of crimes committed within the prison. We should apply to the society of prisoners that process of natural selection to which we owe not only the existence of our race, but probably, also, of justice itself, which little by little gained the ascendancy by the elimination of the more violent individuals. The expense of maintaining such establishments, however great it might be, would be less than that to which society would be subjected by the commission of fresh crimes and of new trials, which often cost fabulous sums.

Criminals, whether they are or are not diseased, are dangerous to themselves and dangerous to the posterity to which they may give origin; their sequestration is no more unjust than that of the insane, and is perhaps more useful. Moreover, some of our most celebrated statisticians and magistrates, Doria, Barini, and Manfredi, for instance, have proposed the erection of prisons for the incorrigible. Beltrani-Scalia attempted to carry out the idea.

Criminal Lunatic Asylums.—There is another institution which we believe would contribute to the welfare of humanity, and that is the establishment of asylums for the criminal insane, where, with all the security of the prison cell, but under the care of physicians, those who commit crimes from insanity, or who become insane in prison, may be cared for until restored to health.

The theories of punishment may be discussed at length from

every point of view, but all will agree upon one point, that among criminals or persons that are deemed such, there are many who are, or who always have been, insane, for whom imprisonment is unjust and liberty dangerous, and for whom we make bad provision by the use of methods which violate both morality and safety.

The English have for a century attempted to, and for sixty-six years have almost succeeded in filling up this great social gap by the establishment of criminal insane asylums. The number of criminal and dangerous maniacs was constantly on the increase; in 1868 the number had risen to 1,244, in 1882 to 1,475 (of which 346 were women), while in 1844 there had been only 235. A law was passed that they should not be let out except by favor of the Queen. By successive legislation, it was arranged to place in these institutions, although in a separate place by themselves, not only prisoners who had become insane, but the insane during their trial or shortly before it, returning the first named to prison as soon as they were cured. The discipline and the security in these institutions are quite equal to those of the prisons, but the insane are treated as sick people, and the establishment is under the direction of physicians. Similar institutions exist in America also.

In France and Italy, if the insanity manifests itself during the trial, the trial has to be suspended, and the accused is put into an asylum; but it frequently happens, that if he is proved to have been insane before the commission of the crime, he is at once discharged, with what peril to society and even to the nation may be realized by recalling the excesses committed during the Commune by many of these individuals discharged on the plea of lunacy. Therefore it is imperative that these dangerous persons should be committed for life to asylums, rather than that they should be set at liberty.

The Death Penalty.—When incarceration in prisons or asylums does not suffice for the protection of the honest members of society, when criminals serving a life sentence threaten to kill or do kill their keepers, or in those cases in which sanguinary crimes become epidemic, menacing the safety and honor of the nation, those of our school believe in the necessity of the death penalty, which in time of war is applied for the same reasons, in greater proportions, and to much more valuable individuals. Those of our school believe in capital punishment because, the basis of a divine right once abrogated, there remains to human justice only that of social defence, and when this cannot be accomplished by imprisonment alone, nothing remains but to eliminate the most dangerous elements. This is in fact the foundation theory of the perfecting of the human race by means of selection and the survival of the fittest.

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OLD AGE.

BY

J. BOY-TEISSIER,

MARSEILLES.

OLD AGE.

In the following pages I propose to study first the modifications which senility brings in the economy and which constitute for man a state of being in some sort new, so important are the differences in a functional point of view which separate the adult from the aged. I shall then take up in turn each apparatus in order to determine in detail the changes which senility produces in the evolution of the ordinary diseases. It will be difficult to treat of such a large subject in the necessarily narrow field of an encyclopedic article, and in order to avoid repetition I shall divide the work into three parts. In the first we shall study the old man in health, the physiological old man, that is to say, normal senility. This is a corner in general pathology which has been somewhat neglected, its literature being very meagre, and I shall therefore devote the greater portion of the article to this section. A second part will be given up to the study of the diseases of old age, that is to say, those which are the consequence of the senile changes; it might have as a sub-heading: how an old man dies. Finally, we shall study briefly in the third section the modifications observed in the evolution of the ordinary diseases when they attack the aged.

NORMAL SENILITY.

The literature of senility is, as I have said, meagre, and we may ask why it is that the study of the diseases of old age is of very recent date. The first answer to this question which presents itself to the mind is that it is necessary to have a store of facts in normal anatomy and physiology before a study of man at different ages can be undertaken with profit. Indeed, we can hardly imagine that Pinel, Roslau, Cruveilhier, and Beau in France, Day in England, Canstatt and Geiss in Germany—to cite only the older writers—could have written their works or made their observations had not the data on normal anatomy and physiology been already sufficiently exact to enable them to establish comparisons. Before the period when scientific observation became the only rule in the search of

truth, every incursion into the domain of senile pathology was idle; it was impossible even during the time when the foundation was being laid upon which the exact relations between the different physiological phenomena could be predicated; the differences which the same phenomenon may exhibit at different ages could necessarily be studied only afterwards.

The importance of general ideas is so great in medicine that there can be no real and durable progress without them. Without general ideas the sciences are but a series of narrow and fruitless notions. Who is the best physician? Is it he who registers best the facts submitted to his observation, whose minute records of the patient's symptoms take in the most minute detail? No; for the most complete observation would remain sterile if it failed to discover the point at which the observed facts were related to the general idea, if it did not take into view all the facts together in such a way as to enable us to recognize the relations of one to the other and of each to the great physiological laws. For then only is the entire field illuminated, the disease placed in its proper category, and the diagnosis made with a distinctness which the multitude of aggregated facts can no longer render obscure. It is for this reason that a general view of our subject is first necessary, that we may establish a standard of comparison when brought face to face with disease in the aged.

We must first study the question as to what senility is. Is it a disease, as Cicero wrote and as most medical authors have admitted, the most recent work on the diseases of old age having even taken this epigram of the Latin writer as its motto? But we must first define disease.

Let us admit for a moment that old age is a disease, if by this term we are to understand every modification of the normal physiological state. But then we must settle definitely what is to be understood as a normal physiological state. If we were to take the functions of a healthy adult as a standard we could evidently compare each function in the adult with the corresponding function in the old man, and it would then be very easy to note the most striking differences not only in the physiological functions but also in the texture of the organs. These two terms embrace the modifications occurring in the economy of the aged, and Charcot has justly remarked that some of these modificatons are of such a nature as to lead to the greatest confusion with lesions which are to be regarded as strictly pathological. Since, then, certain modifications due to senility and certain other truly pathological lesions are identical, it would seem to be entirely logical to inscribe senility in the category of diseases.

But it is not exactly correct to say that disease is simply a modifi-

cation of the normal condition. If that were so the process of development would also be a disease, since we find very obvious differences in function between the period of growth and adult life, the latter being taken as representing the normal state. If I seem here to be forcing a little the meaning of these terms and to be exaggerating the comparisons somewhat, my excuse is the necessity of so doing in order that we may not be deceived by appearances. Indeed, we sometimes see these peculiarities existing during the period of growth, and which are ordinarily not looked upon as constituting a pathological condition, take on such an intensity as to become actual lesions and lead to disturbance of function. We then say that disease exists, but not until then; for up to that moment the organism is under the influence of a particular state which is peculiar to that period of life. Disease occurs only when the modification is such as to hinder the progress of the organism in the direction in which it ought naturally to tend, that is, towards adult life; up to that time there is only a very active functioning—a *plus* functional activity.

We may well ask why the same is not true of old age. We do wrong to study the senile organism only at a period when the functions of the old man have departed so widely from the normal that there is a disturbance of equilibrium between the various organic functions to the detriment of the general health. But before this period—this pathological period, to employ a more precise term—arrives the organism is under the influence of a state peculiar to that time of life during which the various functions tend to diminish in force and duration. There is as yet but a retarded functioning—a *minus* functional activity; it is not yet disease, but it is senility.

It is important to differentiate clearly this period, which is a departure from the normal, from that state in which there are actual anatomical lesions associated with physiological troubles of senile origin. It is during this period, when each organ is becoming senile, that the opportunity of medicine presents itself to oppose a too rapidly spreading "senilization." It is while the organism is becoming senile, and not when it is already senile, that the physician has it in his power to aid and protect it. When we have discovered the causes of senility peculiar to the individual we shall be better able to contend against its march towards an irremediable condition.

We must therefore study man before the organic changes with their dependent troubles have constituted a definite and incurable senility. We must study him, not during the latent period of the senile disease—at a time when disease actually exists, although perhaps giving no clear signs—but while he is growing old. We must detect at the earliest possible moment the signs of senilization, before

senility is actually present. It is during all this period that the slow process is taking place which Canstatt has described under the name of "senile involution," a very proper term but one which authors following him have unfortunately turned in a measure from its true meaning, applying it to an established pathological state, while the author himself sought to designate by it not an established lesion, but rather a transformation being gradually accomplished by a work of slow regression, one which might in the end, however, pass into a definite pathological condition.

Canstatt's idea was an eminently correct one, and it would have been much more fruitful had it not been turned from its proper direction in the way we have just remarked. I believe we ought to return to the original meaning and substitute a less narrow conception of old age for that of lesion and disease. We must especially look less intently upon already established and immutable senility and more upon gradually progressing senescence, so as to be in position to detect the first signs of it, to discover its causes, to recognize it in its different aspects, and to learn how to retard its progress and to prevent as long as possible the occurrence of definite and thenceforth incurable lesions.

We must not look upon this division as an arbitrary and purely artificial one. When I maintain that we have to distinguish two stages in the idea of senility, I can defend my position by recalling the facts of biology, which enable us to take a wider view of old age than we have been accustomed to do up to the present.

Formerly the evolution of a living being was described as being limited to three stages, and it was said that living beings were born, grew, and died. But there was no justification for leaving in the shade the period of decline, that during which the living being advances, often so slowly, towards death. This period is as inevitable as the others, and in the normal existence of any being (who dies naturally as the result of wearing out of his organs and the tiring through long use of his functions, and not from accident) this decline is as necessary biologically as is growth.

We must then regard senescence not as a disease but as a phase of life. The changes occurring in the aged are simply a different mode of being, they constitute what is as truly a physiological stage as is childhood or adult age.

Senility is a Normal Phase of Existence.

It is important always to have the idea in our mind that old age has its place in normal existence, otherwise we might let this period of senilization pass unperceived. It is a period during which, with-

out being a sick man, the senescent has need of the guidance of the physician in order that he may not grow old too rapidly or in an irregular manner.

In order to establish this proposition firmly it will be necessary to pass somewhat beyond the strict limits of our subject and to make a little excursion into the domain of biology, for in this way only shall we be able to get a clear conception of normal old age, and its importance as regards the changes which it induces in the anatomical constitution of the organs will then be most apparent.

We must first see what is the present scientific conception of life. We do not propose to discuss at length the vexed question of life itself, for that would take us too far. But I would remark in passing that life may be conceived of apart from the existence of organized matter, either animal, vegetable, or mineral. Let me explain: The simple bodies which enter into the composition of an element might no doubt be grouped in other and entirely different ways; and we cannot to-day regard them as the only means whereby life is able to manifest itself. Furthermore, these simple bodies, to which we are prone to turn as to the initial point, are doubtless themselves decomposable into other more simple bodies. Reason permits us to conceive of this procedure of successive decomposition until we come, at the last analysis, to the very essence of matter, as yet unrecognizable in the present state of our knowledge. Therefore, the forms by which life actually manifests itself are seen to be insufficient to serve as the only foundations upon which we may base our explanation of life.

The task to which we shall confine ourselves will be to give a correct idea of the *living being*, since it is he who is the sole object of our study and whom we must know thoroughly in order to follow him in his evolution and to be able to take note of the important modifications which he may present under normal and pathological conditions. In one of the early chapters of the treatise on biology by Ch. Létourneau, we find a criticism of the most authoritative definitions of life which are almost all wrong in comprehending either too much or too little. Létourneau very justly says that it is better to come down a little nearer the earth and to limit one's self to a *résumé* of the principal vital facts observed. His own definition of life is the following: "Life is a double movement of continuous and simultaneous composition and decomposition within plasmic substances or anatomical elements which, under the influence of this movement, functionate in conformity with their structure." This is rather a definition of the living being. And in this case the expression "to functionate in conformity with their structure" is rather

vague, since nothing in the definition explains the why of this structure.

I would venture to give the following definition: "The living being is a temporary individualization, in a variable form, of a sum of forces capable of assuring the permanence of this form and of causing the determination of like forms before becoming disintegrated." I believe this definition is nearer the truth. If exception be taken to the term "sum of forces," I can defend it only by saying that the language of science has not furnished any other words which in themselves have a sufficiently definite meaning, and which might not have opened the door to more discussion. Matter is unfortunately not yet known in its essence, but as matter and force are inseparable from each other, it has appeared to me that the second term would represent a more real entity and one less subject to controversy. This explanation given, we find in this definition an expression of the principal characters of the living being, since it shows him first becoming individualized, finding in himself the power of assuring the permanence of his own or immediate personality, then his second or mediate personality through the procreation of a similar personality, finally terminating his cycle by restoring to the external world the elements of his constitution. The final term, this "disintegration," is death; the time during which it is being accomplished is senescence.

We are now nearly ready for the question, "How does the living being die?" and its consideration will embrace the study of senescence and old age in man.

But before replying to the question as to what death is, it seems to me that it would be useful to fix more definitely our conception of life and of the living being, and with this end to analyze briefly the primordial characters of living matter. The essential characteristic of living matter is instability, and it is by that that it is chiefly distinguished from other forms of matter. We need not enter here into the apparent differences in the two forms of matter; the limits between the two are shifting every day, and in Sabatier's book we may find the reasons which seem to militate in favor of the identity of the two. But this speculative question apart, the apparent difference is one of stability and instability. The manifestations of this stability are multiple and constitute in some sort the attributes of living matter. They are irritability, motility, the faculty of exchange with the external world, and finally the faculty of reproduction, which is perhaps its most marked characteristic. We know, indeed, that under the influence of special affinities or of external agents the constituent elements of certain inorganic bodies may unite and form these bodies

without the presence of a particle of such bodies being necessary, but that a fragment will never of itself alone determine the production of living bodies. Living matter, on the contrary, may effect the appearance of its elements either directly if they are free, or indirectly if they are bound together in more complex combinations necessary to the constitution of a new quantity of living matter identical with itself, or perhaps better than the original according to the richness of its external surroundings. But the presence of some particle of living matter is necessary to stimulate the formation of new matter; and it is the resultant of the actions exerted by this particle on the surrounding medium which alone has determined the process of integration of the elements contained in this medium in order to form a new particle of living matter. This rôle of attraction of surrounding elements which the particle of living matter plays is, according to Sabatier, a most important one in the existence of living matter, and he says that protoplasm plays it of necessity. This is to endow protoplasm with an intrinsic property which is "the characteristic of living matter, since, in the absence of this action, protoplasm could not find for its growth or repair a ready-formed protoplasm which it would only be necessary to appropriate."

There is more than simple ingenuity in this interpretation of the phenomena of nutrition, and if at first sight this conception of a power of attraction (*pouvoir d'amorce*) of living matter seems to be confused with the function of assimilation, nevertheless a careful study will show us all the happy consequences that this interpretation may have in giving us a more intimate knowledge of vital phenomena in general. It seems to me that in this manner of conceiving and of interpreting the means by which living matter repairs itself there is more than the simple lighting upon a happy word, and that we should be wrong not to see in it something more than a new synonym of the words assimilation and nutrition. We must understand the meaning of the word "attraction" (*amorce*), which is to be taken as "a movement capable of exciting a like movement in a suitable medium." This is the interpretation that we would give to the term, and it is in this sense that we shall use it whenever speaking of the "power of attraction." It is by means of this that we can picture to ourselves readily all the moments of living matter; it is by it that we may interpret all the movements of integration, of constitution, and of repair. On the other hand the movements of disintegration, of division, and of destruction are due especially to a diminution in the power of attraction. We are led therefore to regard the latter as playing the first and principal rôle in the maintenance of life, since by it living matter may be created, and by it also this living matter

may be nourished and developed, and may give birth to other particles of living matter.

We may now take up again the subject of our present study, why living matter dies, and we shall then be able to study how it dies. Life is but a constant transformation of matter, and we may say that life is everywhere. Speaking very generally we might even deny death and say that it does not exist. But we have limited our study to living matter and have seen what are its chief characteristics, and if these characteristics are lost or transformed, it is evidently no longer living matter. Life will always be; but living matter, considered in its own individuality, may disappear, and we say it is dead; death therefore exists. We might define death by saying that it is the loss of the characteristics of living matter.

An answer to the question why living matter dies would appear to be full of difficulties, for at first sight it would seem as though all the conditions for immortality were present in it. It possesses a strong power of attraction, its instability enables it to accommodate itself to the necessities of its environment, and its surroundings furnish an inexhaustible mine whence it may obtain all the elements needful to it. We might therefore suppose that there could be no reason why its characteristics should become modified, and in the words of Sabatier, "potential immortality would be assured to it, in other terms it would remain protected from natural death." It is evident that the expression immortality should not be taken here in the sense of immutability. For if nothing could change and if all the elements remained immovable as to their relations with each other, there would evidently be a loss of instability and of the power of attraction, the two principal characteristics of living matter. It means only that there is in primordial living matter a fixity which persists in spite of the incessant partial modifications which are the essence of its life; it takes from the surrounding medium under one form that which it returns under another, retaining matter of which it has need to compensate for the losses consecutive to its functioning, and so to preserve its identity. In living matter which we are to study, these mutations of detail to which I allude are certainly slight in relation to the mass and take place only little by little, so that it would be impossible to say what parts are renewed and in what quantity they are renewed at a given moment. These portions become immediately an integral part of the mass whose qualities, habits, and tendencies they assume, identifying themselves with it and enabling it to continue without interruption so that there is continuity and identity. It is in this sense that we must admit the expression immortality of primitive living matter. It would seem

therefore as though living matter, when once established, ought to remain eternally identical with itself as long as the surrounding medium satisfied its power of attraction, and death would therefore seem not to be inevitable.

Why then do living beings die? Living matter in its most simple form manifests its vitality by a very strong power of attraction which assures to it a constant and proportional reparation; it has but a very narrow field in which to manifest its existence, viz., its power of attraction and its instability. But as soon as we consider this living matter having acquired by means of differentiation a higher degree of perfection, the relations are changed. All differentiation in living matter determines as a first result a departure from the primitive type and a modification of its first functions. In proportion to the quality of the function will correspond a diminished quantity of functional power, and we find that the quality of vital power is in inverse ratio to quantity in its functions; it is thus that the energy is more intense as the being is less differentiated.

We may conceive, as I have said, that potential immortality must exist in the world; but it was a property not of protoplasm as we know it to-day, but of primitive protoplasm. This protoplasm may have had neither form nor limited dimensions, but the first step in specialization is accomplished when fragmentation takes place. The intimate structure of these fragments gives us two distinct classes of beings, viz., the unicellular beings and beings with several cells, or metazoa. In the first, differentiation is shown by the production of a nucleus, and this nucleus, which is the part further removed from the primitive condition, is precisely that whose decadence is always first seen. In metazoa we see from the beginning that there is a formal distinction between the cells; some differentiate themselves very markedly and form the various tissues—they will die; the others preserve, to use Sabatier's expression, "a conservative silence"; they remain what they were and keep intact their power of attraction, which will enable them to perpetuate themselves; these are the reproductive cells. The immortality of the reproductive cells had already been noted by Weissmann, although he could not explain it satisfactorily. Bütschli has endeavored to do so. Observing that infusoria in process of decadence may acquire new force by the phenomenon to which he gave the name of conjugation, he assumes that fecundation of metazoa is an act of the same order: the egg, the reproductive female cell, which alone is capable of being rejuvenated, is renewed by the spermatozoid, the reproductive male cell, which alone is capable of rejuvenating. These ideas have been invested with a scientific precision in the works of Koehler. We shall find another

proof of the rôle played by cellular differentiation in the evolution of primary connective tissue.

The more, therefore, the elements are differentiated, so as to constitute as it were a number of isolated individuals in one individuality, the more their own power is reduced, since they cannot any longer live of themselves and have need of collectivity to sustain themselves. Their instability and power of attraction, these two primordial characteristics of living matter, have been lessened; they have become mechanisms which, like all mechanisms, wear out through use; they are then condemned to senescence and death. Delbœuf in his first memoir sustains this theory of senescence and death by differentiation and specialization of the functions, which we may call the physiological theory. In a more recent memoir he abandons his first theory and enters the domain of pure philosophy. On closer inspection this theory is seen to give us in part only the desired solution. For although we may readily grant that the differentiation is accompanied with a lessened power of attraction and therefore of a lessened resistance, yet we must admit that alongside of the machine which wears out there is also the machine which is made to repair, and we must seek for an explanation of the imperfect discharge of its reparative functions by the latter. This explanation may be found in the fact of differentiation pushed to its extreme limits better than in that of wear through use. As long as the differentiation in living matter was weak, the non-differentiated portion retained a sufficient power of attraction to repair the losses due to the differentiation; but gradually the cell has lost its general functioning power and has become an agent, a cell with a determined function—a nervous cell, a muscular cell, etc. At each step in the process of specialization it loses a portion of its reparative power, because it loses more and more its power of attraction. Thus, when a localized traumatism occurs the lacerated elements of the organism cannot be restored and a cicatrix results. That is what we see in the nervous centres; the too differentiated nervous cell can no longer make nervous tissue, but connective tissue is formed in its place. Now primitive connective tissue is made up of elements which have no distinct characters; it is the least differentiated tissue, but it is also the one which has the greatest power of attraction, and that is why it replaces in cicatrices the very differentiated tissues which are incapable of autoregeneration. This is why we see it also gradually taking the place of the noble cells which have been worn out through use or have been accidentally rendered incapable of performing their special functions. We shall return to this when we come to study the anatomical changes of senility. This evolution of connective

tissue justifies the phrase employed by Charcot in the first of his lectures: "The textural changes which old age induces in the organism sometimes attain such a point that the physiological and pathological states seem to mingle by an imperceptible transition, and to be no longer sharply distinguishable."

We now see that matter dies in consequence of its differentiation and specialization, the effect of which is to replace by a determinate adaptation and a specialized function its two fundamental properties of instability and attractive power. It dies when the differentiated and specialized elements have worn out their coefficient of resistance, which is not inexhaustible since the differentiated element can no longer regenerate itself. Its senescence will be just that period during which the element lives upon its reserve; it will begin as soon as the element has arrived at its highest degree of differentiation.

We may apply these general biological notions to the study of man, who presents an elevated type of the individual with very advanced differentiation. The cells from the first days of their embryonal life, scarcely yet differentiated, enjoy in a very high degree this power of attraction and instability; but little by little differentiation becomes established and specialization develops; at the same time and proportionally with this we find a loss of instability and diminution of the power of attraction, and soon definite groupings will be constituted. We have no more cells of intense life but many cells of limited life, since one cell will have nothing to do except to contract or feel, or another to secrete, to the exclusion of all other functions. From these groups will arise the nervous centres, the hepatic lobules, tissues with narrow life and limited duration, since they have lost the faculty of reproducing themselves. The organs have a very determinate function and a limited one, since their resistance is proportionate to the diminution of the attractive power, which is itself in inverse ratio to the degree of differentiation. We see then function diminishing in intensity in each organ in proportion as it uses up the coefficient of resistance which it possessed at the moment of most perfect differentiation and which is not renewable. The totality of these organic losses gives as a result a diminution in the intensity of functional life—that is to say, senility.

A secondary question here presents itself. Senescence and senility, the loss of attractive power and differentiation of the cells, ought to begin at the same period for each group of cells and for all individuals, and yet they appear at a different age in each individual. This is no doubt because the power of attraction is not the same in each individual, but is of variable intensity, and because each organ has acquired during its differentiation a special coefficient of resist-

ance. We know, indeed, that protoplasm has not always the same composition. Carbon, hydrogen, oxygen, and sulphur enter into it in variable proportions, and these chemical differences are sufficient to lead us to admit possibilities of variations in its evolution. We cannot say that in the beginning there may not have existed different forms of protoplasm. This also may explain why hereditary and congenital or acquired diatheses, since they alter the chemical structure which is the substratum of dynamic life, may give to the protoplasm variable power of attraction and also special coefficients of vital resistance. This also would explain the differences, apparently so inexplicable, between races, families, and individuals.

These facts show that senescence and senility constitute very actually a phase of existence which leads to death just as normally as the period of growth leads to the complete development of the individual. Senilization is then constituted by the different phases through which a sum of forces passes from the moment at which it becomes separated from the great movement of unconscious life by its specialization into a definite form, in order to produce a special and narrow, but conscious evolution, until it reënters again into the general and unconscious movement. Death, then, does not exist, regarded from an elevated biological point of view; it exists only in relation to the individual, and it ought to be regarded as an ordinary function. Thus the picture of death from senility, viewed apart from any moral or physical preoccupation, is free from sadness or grief, since it produces no pain. There is a progressive and never sudden diminution of all the organic activities. It is a picture of calm, of drowsiness, of slow annihilation in which we are unable to tell the precise moment at which all activity has definitively ceased.

Senility Explained by Biology.

Thus far we have remained wholly within the domain of general biology. I now propose to demonstrate that the same laws apply to man and to show what their importance is in the study of senility; for it is in the idea that we must acquire of the power of attraction (*pouvoir d'amorce*), as explanatory of the maintenance of existence, that we shall find the long-sought explanation of senility.

Theories of Senility.—But before going farther it will be of interest to review very briefly the principal theories which have been proposed in explanation of senility in man. The first was put forth and defended by Réveillé-Parise. This is that the cause of senility resides wholly in changes in the respiratory apparatus. Under the influence of the functional trouble resulting therefrom, hæmatosis is

accomplished in a defective manner; the oxygenation of the blood is interfered with, and following this we find changes in the constitution of this fluid. Now, as the blood is the agent charged with the transport of nutritive elements into the tissues, the latter must of necessity suffer from faulty nutrition; whence the weakening of the organs and their consequent degeneration. There are several objections which may be made to this theory. In the first place the priority of the pulmonary alteration has not been demonstrated, and secondly it has not been explained. What led Réveillé-Parise into this path was evidently the desire to find a single agent which could account for the generalization of the senile changes; this single agent could manifestly be only the blood. The relations between the blood and the respiratory function being indisputable, and the frequency of the pulmonary changes being, furthermore, undeniable, it was natural to incriminate them as the sole cause of senility.

The weak points of this hypothesis did not escape other authors. Thus Hamelin modified it somewhat, in his course of lectures at Montpellier. He believed in the importance of the changes in the respiratory function, but he gave to them a secondary place. The first cause of senility would be the normal evolution of man pushed to an extreme. The consequence of this would be general ossification carried to a very high degree; under its influence the costal cartilages would ossify and the mobility of the sternum would disappear in consequence of the union of the different portions of this bone; the movements of the thorax would therefore become very limited, the respiratory function would be impeded, and thus the oxygenation of the blood would be interfered with.

It is not difficult to find serious objections to this ingenious theory. In the first place, if we make a list of the stigmata of senility found in a number of old people we shall not always find ossification of the cartilages of the thorax nor even a real diminution in the mobility of the chest walls; furthermore, we may equally assume that these osseous changes, when they exist, are the result of senility and not its cause. We cannot deny that a diminution in the respiratory function may be a powerful factor in hastening the movement of senilization, for it leads to a loss of an element of repair and resistance in the economy; but to place senility, a general state of the economy, under the exclusive dependence of a change in a single function would be to regard the question from a too narrow standpoint.

There is another theory which has many partisans, and among them men of high scientific authority. In this we leave the domain of pure hypothesis based upon statements in the analysis of which

observation occupies but a very small place, and we enter into the domain of facts, and the generalization of these suffices to give decided weight to the opinion of those who have observed them. We ought therefore to study it with care, and all the more since most physicians hold it exclusively at the present day. This is the theory which finds in sclerosis of the organs the sole cause and explanation of senility. I shall mention only for the sake of record the first works on arteritis. Gull and Sutton gave to this lesion affecting the small arteries a primary importance as regards the cardiac disturbances consequent upon interstitial nephritis. Numerous researches have confirmed, while modifying these conclusions, and I need only mention the names of Rigal, Juhel Renoy, H. Martin, Lancereaux, Duplaix, Dumange, and Lannois to show the interest felt in the question of arteritis. The facts which have most struck these authors may be summarized as follows: Arteritis and sclerosis are constant in the aged; on the other hand, the rôle of arteritis in the production of sclerosis has been clearly demonstrated, among others, by the important researches in arteriosclerosis made or inspired by Huchard. The conclusion based upon this correlation has been that arteriosclerosis is the cause of senility. Such is the theory admitted almost universally, and if discussion exists concerning it it is solely as to whether endarteritis exists before periarteritis, or the reverse; and if there is still discussion as to whether arteritis may produce sclerosis by itself without the aid of periarteritis, or whether the two alterations must act together, there is nevertheless unanimity to the effect that senility is dependent upon arteriosclerosis. If this is the correct opinion, we might deduce from it the law that the function of arteriosclerosis is senescence.

Only one proof is wanting for this seductive theory, that, namely, which would demonstrate that arteriosclerosis itself is not a consequence of the senile process. H. Martin appears to have foreseen this objection. Giving to obliterating endarteritis the chief rôle, he finds it present in the most minute arterioles, and describes a sclerosis due to a lesion of the arteries of the smallest calibre. The mechanism of this fibrous production is simple. The progressive obliteration of the vascular canals diminishes gradually the amount of nutrition of the organs, and this of necessity leads to dystrophic sclerosis. But what is the cause of the changes in the smaller arteries? According to H. Martin this alteration is due to contact with a vitiated blood. The capital objection to this explanation is that it does not explain, since it gives no reasons for the vitiation of the blood which is stated to be the primary cause of senility. In all these theories we find in the last analysis that a change in the blood

is proposed as the first cause of senility, but this opinion is sustained by no satisfactory explanation. We must nevertheless admit that the researches of H. Martin have done very much to increase our knowledge of generalized arteritis and its pathogenic rôle in the production of sclerosis. We shall see later that this conception of arteritis from vitiation of the blood is an important one, for it explains the mechanism of arteritis from autoinfection as I demonstrated in a communication made to the Marseilles Medical Congress in 1891.

All the objections to the theories which I have just reviewed have been made by Brousse, who dwelt at length upon their weak points in his thesis. While he did not himself propose a definitive explanation of senescence, he applied very happily to the question of senile evolution the classical researches of Bouchard, and I believe that we have only to generalize these data and apply them to the study we are now making.

Up to the present all these theories incur the same reproach, they take the effect for the cause. There is a reason for this, and that is that all the authors have fallen into the error of taking a lesion already existent as the point of departure and guide for their work. We escape the same criticism by applying to senility, studied from a medical point of view, the notions which an incursion into the domain of general biology will have made familiar to us.

Development of the Embryo.—We may review briefly these facts. From the earliest moment of conception the embryo, composed of simple elements, manifests an extraordinary power of attraction; the exchanges are of the highest degree of intensity, and we may affirm that the vital energies are at their maximum. But little by little differentiations become manifest. We soon discover the trace of diminished functional activities, since a part of the embryo is already specialized in the blastodermic layers. In a general way this first differentiation is definitive, since each layer presides over the constitution of one or another part of the body, except in the case of teratological malformations. This is perhaps a first step towards senescence. As soon as this differentiation and specialization have been effected, there is produced a diminution of the power of attraction, evidenced by a limitation in the exchanges which will henceforth be made only in view of a restricted adaptation. However, even at this time the vital activities are so intense that we may separate them from any notion of senilization. But little by little the organic formations, specialized and differentiated for particular purposes, become more and more manifest, and soon the primitive elements have formed cells with restricted functions, such as the nerve cells, the muscle cells, and the secreting cells. From this time their power of

attraction is limited, so limited that it cannot produce the reconstruction of the cell any more than the production of a similar cell emanating from the first; it scarcely suffices for the permanence of the cell itself. The first proof of this is seen in the fact that if any injury happens to a cell it becomes destroyed and cannot restore itself, but connective tissue is formed in its place.

Growth.—But it may be asked how we can explain the period of development or rather of growth if this power of attraction is constantly diminishing; for it would seem to follow from what has just been said, that as soon as an element has completed its development and become adult it can only decrease, so that the life chart of an element would be reduced in the last analysis to an ascending line followed immediately by a descending line without any plateau. The contradiction in this is, however, only apparent, for even if old age in a cell should begin as soon as that cell is completely formed it does not follow that all the cells attain their full development at the same time; many of them remain, so to say, in a latent condition, and it is their progressive falling into line which in reality constitutes growth. In other words, growth is a question of the number of cells, and not one of cellular vital intensity. But let us follow this cell and suppose that no accident occurs to interfere with its normal evolution. One of the first facts shown by observation is that the future of each cell is in relation with its function, and that the length of its life is inversely proportional to the importance of this function. It even seems that the more complete this function is the more strictly is it confined within definite limits, and the more it brings into play the totality of the constituent elements of the cell, the shorter is the duration of existence of this cell.

An example will make my meaning clear. Let us compare a muscular cell with a cell of a secreting gland, each in its highest degree of differentiation. One is charged with producing movement, and if we decompose it we find in it a constitution adapted to its function. But we find also parts of this element which are not strictly necessary to produce movement; we may see in this fact the proof of a less marked differentiation. If we then examine the cell of a secreting gland of the holocrine type, the function of which is to provide the materials of secretion, we find it first under the aspect and with the differentiation of a simple, ordinary, indifferent, epithelial cell; during this time it enjoys a relatively important vital activity and may nourish itself properly. But differentiation produces a marked change. From the condition of an indifferent epithelial cell it passes to the active state, and fine granulations are produced in its substance; little by little these granulations become more and more abundant, even so

as to modify the external appearance of the cell. We see here a differentiation of this cell which has for its end and aim a specialization, the term of which is the transformation of this cell into a granular mass, in which the epithelial cell is no longer evident as soon as its transformation into a granular mass appropriate to the secreting function has been accomplished. This death has been preceded by a period of senescence, the period, namely, during which this transformation was being accomplished. During all this time the power of attraction still existed, for it presided over the exchange which permitted the terminal differentiation to be accomplished in the interests of the function; but little by little the differentiation takes place, leaving intact a constantly lessening portion of the original epithelial cell, the total transformation of which into a granular mass finally causes its complete disappearance. These are two examples which show well the importance of differentiation as regards the vital resistance. The more there remains of the primary cellular element in the differentiated element the greater will be its resistance, but also the less specialized will be its function. This is why in even advanced old age the muscular element opposes a resistance to senilization which is not encountered in the more specialized tissues, such as the gland cells which die more rapidly. We must then accept with some reserve the opinion of Haushalter, who says, in speaking of the senile heart, a muscular organ, "that it ceases to beat only because it no longer finds in the organism a cause for functionating." As physicians we must be somewhat distrustful of these words, which are so graphic. I believe that the heart, a muscular organ, exists under conditions of special resistance—fortunately for the organism, which has need of its functional activity. These conditions make of it a mechanism which is capable of carrying on its functions longer than the others, and when it stops beating it is because it also has exhausted its coefficient of resistance. We have thus seen how differentiation diminishes the resisting power of the elements.

This is the reply to the objection which has been made that alongside of the machine which wears out there is the machine which is made not to wear out. It would seem natural that the epithelial cell—an element already highly placed in the series, but still retaining a part of its power of attraction sufficiently great to give it a long-resisting power—remains for a long time identical with itself. Let us see what happens when the conditions of existence are changed for this cell; let us see what it does in becoming differentiated. It loses on one side and gains on the other. That which it gains is a higher position in the hierarchy of agents charged with a function; it acquires qualities; it raises itself from the relatively

inferior rank of a simple epithelial cell to that of an epithelial cell charged with a special function; all the living forces of this unity are directed towards a very specialized end. But this modification is made to the detriment of the mass itself of the cell. The objection will be raised, perhaps, that this change might have taken place without detriment to the cell, and that just as it had in itself a power which it employed to maintain its equilibrium, so it might also have had the necessary power to draw from itself that which would endow it with a new function, without thereby annihilating itself. It seems to me that the answer to this objection is easy, for this would force us to assume a duality of manifestation of the activity of each cell, one permanent, the other intermittent; the first represented by the power of attraction, the other, more or less latent for a longer or shorter period, representing a functional force ruled by some unknown mechanism. This is what we see in non-differentiated protoplasm, which is charged with all the functions, including reproduction. We recognize this aggregation of properties, and we know that it constitutes for living matter that which we have called potential immortality. But in proportion as the living matter rises in the series, and the complexity of its mechanism is accentuated, we find a more and more strict application of the law of division of labor. It is by that that we explain the reparative incapacity of a cell which is charged with clearly defined functions; it has to give itself up entirely to its adaptation. Unity and simplicity are primary laws in nature; and it is most simple to assume that a cell, called upon to play a new rôle, should raise itself to the height of its new task and should be able to do so only by demanding from its own coefficient of power the necessary forces for its new adaptation. The contrary would have turned its energies from their first utilization, and if these energies were reduced to a power of maintenance only, a more perfect differentiation could be made only to the detriment of the resistance. This diminution will be fatal to the cell, which will die after a variable period of senescence, and this because the differentiation had caused it to lose a part of its power of regeneration.

Senescence and Death are Vital Functions.—It follows from these considerations that senescence and death are really functions of life, and that both commence as soon as the first specializations have been effected. If we were content with these facts only we should evidently still remain in the region of general and rather vague ideas. We must dig deeper and seek to explain the genesis of organic and perfectly tangible modifications. It has been said that senility leads to atrophy of the organs, to their sclerosis, and for a long time senil-

ity has even been explained by these alterations which are only its effects. We must interpret the phenomena otherwise.

The Rôle of the Connective Tissue.—Up to the present I have scarcely spoken of any elements in the economy except those placed high in the hierarchy of differentiation, but we must not lose sight of the fact that all the elements are not concerned in such lofty nor in such strictly limited functions. There is an element which plays a capital rôle by reason of its extent; that is the connective tissue, which, being but little differentiated, enjoys a relatively great power of attraction. Its rôle apparently is that of the veinstone, the woof, or a support for elements enjoying a more brilliant, but at the same time more precarious existence. It is of all the tissues the one which is capable of the most perfect regeneration in that it is not differentiated. We need only recall what takes place in cases of traumatism involving organs rich in connective tissue. It is the connective tissue of the organ which repairs itself and then contributes to the reparation of the organ, either by means of connective tissue pure and simple, when a cicatrix is formed and takes the place of the unregenerated elements, or by its transformation into the tissue of the organ if the differentiation of that is not too far removed from the primitive type. Its power of attraction may also be exalted by a prolonged nutritive excitation, as we see in the hyperæmia of inflammation, and in general whenever there is hyperactivity of function; in these cases there is an increase in the connective-tissue element. But its rôle is still more extended. The connective tissue, by reason of its facility for multiplication, must also furnish within tissues more differentiated than itself, and so incapable of self-regeneration, elements for supplying the waste due to functional activity or even to enable the organ to increase its volume if its function is to be exercised in a very high degree. These new elements incorporated into the organ will forget in their turn their common origin and will assume the habits and the tendencies of their new neighbors. Sabatier insists upon this point, and regards the connective tissue as continuing in adult life the rôle of the blastoderm in embryonal life; he calls it a post-embryonal blastoderm. It may even, under the influence of temporary hyperactivity, return to the embryonal state and regain under these conditions an increased power of attraction which will be manifested by an intense regeneration. It is in this way that the formation of cicatricial tissues is explained.

As long as there remain enough noble elements in the economy to fulfil all the functions, life will follow its course with an intensity exactly proportionate to the number of these noble elements; but as soon as the latter can no longer be replaced in sufficient proportion,

function will be interfered with. Then senescence will begin, and it will be the duty of the physician to recognize this period as early as possible. The connective tissue will now begin to fill the gaps and gradually to invade the organs; sclerosis will appear, putting obstacles in the way of the discharge of functions and so constituting disease. And as the individual is merely an aggregate of special organs adapted to a common existence, the increasing deterioration of all these functional activities will lead to the gradual deterioration of the individual himself, who will thus gently fade away out of existence.

With these facts in our possession we are now in position to reply to the question proposed at the beginning of our investigation, namely, when and how is senility produced? *Senescence* occurs parallel with the normal functioning of the constituent parts of the economy; *senility* occurs as soon as the coefficient of functional activity of one or several organs is reduced below the normal, not by accident, but by an intimate intraorganic modification. I see well the already formulated objection to this statement, and I shall endeavor to reply to it. I shall be reproached with confounding senility and disease. These words, however, have only the value which may be arbitrarily assigned to them; if by the word disease one would understand every organic and functional modification, whether transitory or permanent, of the economy, regarded in the light of its normal functioning, senility will evidently be a disease. But the conception of disease is very different; it is above all a question of rupture of relations between the different functions of the economy. Now in senility there is no rupture of these relations; it is a normal, complete physiological condition, progressing gradually, evidently different from the general functional condition of adult life, but still presenting well-balanced and constant relations between the different organs and their functions. The word disease calls up in my mind the idea of disorder, of incoördination, of incoherence in one or several organic acts, and not merely the idea of a plus or minus of functional activity.

By this we do not mean to say that disease can never intervene in senilization. Senility is not shielded from the pathological conditions which affect the adult, and there is no necessity for bringing evidence in support of this statement. But we must inquire whether senility may not in itself constitute in the long run a pathological condition. Yes, senility may produce diseases and these are properly the diseases of old age, the latter being regarded as a pathogenic cause. But in this case old age is not alone responsible. This argument requires some development, and we shall find in it an ex-

planation of my insistence upon the necessity of a careful study of old age, and we shall see readily to what frequent use we shall have, in the presence of aged patients, to apply these just and broad notions of senility.

Let me take an example. There was under my care in the hospital a man, seventy years of age, in whom a weighing of the symptoms observed led us to make a diagnosis of chronic nephritis. He presented the symptomatic picture of what we call contracted kidney. That is a well characterized, very clearly defined pathological state; it is therefore a disease. Now at the age of seventy years a man may and ought to be regarded as senile; this patient was therefore an old man, and the question naturally arises whether the chronic nephritis was due to senility of the kidney, whether it was the interstitial nephritis of the gouty kidney, or whether it was a localization of a generalized arteritis. All these are not indifferent questions, for upon the exactness of the diagnosis will depend the prognosis and treatment. It would be hardly scientific to look upon the age alone as the cause, for by confining one's self to this single pathogenic idea one would run a great risk of seeing in the case only a temporary exacerbation of an irremediable kidney lesion calling for little special attention. Nevertheless, as I have shown that the initial cause of this pathological condition might well be a senile kidney, I appear to accept implicitly that senility of the kidney suffices to constitute a disease. In the case to which I allude the patient, seized suddenly with uræmic symptoms, died, and the post-mortem examination showed all the characters of the senile kidney. Before coming to a conclusion, however, let us take another case. This was also a man seventy-five years old; he came to the hospital on account of hemiplegia with aphasic symptoms, with which he was attacked after a meal, and he died eighteen hours later in collapse. The autopsy revealed a cerebral hemorrhage which was the determining cause of death. At the same time we discovered very characteristic senile kidneys. Yet this man, a fresh, lively old man, without infirmity, cleanly and careful of his person, had never presented any symptom of nephritis. Here we see lesions identical in the two cases but accompanied by very dissimilar symptoms, and a comparison of the two cases shows us that disease does not reside solely in the anatomical modification of an organ. But it may be objected that even if the anatomical lesion is not sufficient to characterize the disease, nevertheless the latter exists when to the anatomical modifications are joined physiological troubles. Now in the first case there were very characteristic symptoms of Bright's disease; but no one could say that the old man of seventy-five years, the subject of our second

observation, with his sclerosed kidneys, had no disturbance of ordinary function; we could hardly admit this, and, furthermore, the examination of the urine showed that he had the urine of senile kidney. We see then that a union of anatomical lesions with functional troubles caused in one a pathological condition, a disease, but in the other nothing. That is to say, above and beyond organic and physiological disturbances there is a something which frequently escapes us, because in our examinations we are accustomed to neglect too much an analysis of the interrelations of the various functioning activities. In the first patient the sclerosed kidney functionated without doubt like the kidney, also sclerosed, of the second patient. But what made the difference was less the organic alteration of the first, almost identical with that of the second, or the disturbance which it caused in the function, since we have seen that this existed in both; it was rather in the unequal conditions of the medium that the cause of both the organic alteration and the functional trouble resided. It is the conditions of the medium which constitute the principal element in the pathological determination. In the second patient the senility was installed slowly, progressively, and uniformly; all the organs and all the functions had undergone modifications in some sort parallel. The changes had gone on in such a way that each modification in one organic function harmonized with proportional modifications in all the other physiological acts. Thus life went on quietly in a narrow and constant parallelism; this is why in this man there could be no question of disease. It is this parallelism in the functions which we must conceive and which it is indispensable not to lose sight of if we would avoid taking for a disease that which is really only the result of variations in the normal state of being at different ages. We shall not then be tempted to disturb by meddlesome interference physiological acts which appear abnormal solely because they are compared with what we are very wrong in regarding as representing exclusively normal conditions.

We do not of course mean to say by this that we must not occupy ourselves with the modifications of texture and of function in the organs in senility. This would be inexcusable, and all the more since frequently we may see organic or functional modifications carried to such a degree that it would be impossible to establish a difference or a strict boundary line between the effects of senility and those of disease. I have already said that this resemblance, which is absolute in a number of cases, was the principal basis for the opinion which so long identified senility with a pathological state.

We must now seek (1) to determine the changes of texture that senilization provokes in the organs, and (2) to establish the physio-

logical condition of the organs thus modified. This will constitute two chapters of senile anatomy and physiology in which will be shown the differences in function in old age and adult life. Thus far we shall have studied only normal senility, that which has been of regular evolution and in which nothing has happened to hinder its development. But if we end our investigations there we shall have presented but an incomplete picture of senility. There is another point, very important to the physician, which it is indispensable to render perfectly clear, namely, the pathological conditions which are the consequence of senility. There are diseases peculiar to old age, those which have been determined by the senile process itself, but which we must not confound with senility.

We may ask why these changes imprinted by senility upon the organism determine different diseases in different individuals. Evidently there are here individual differences, referable to the combined action of causes, upon which it is necessary for us to dwell for a moment. I need not insist upon one point which will doubtless present itself at once to the mind, namely, the variations of resistance which each organ may offer to the senile process, variations which may be dependent upon the habits and mode of life of the individual or the diseases from which he has suffered during his former life.

Temperament and Diathesis.—I think it will be well to dwell a little more at length on this question of temperament and diathesis. Bouchard defines temperament as the dynamic characteristic of the organism; it is all that which concerns the individual variations of nutritive activities. We have only to apply this definition to the senile process, and we shall easily explain by it that the senile process may not and ought not to affect equally and in the same degree each organ, since each individual will present variations of nutritive activities. This gives us an explanation of the various aspects under which senility presents itself to our observation, when we compare several aged persons with each other. And further than this we shall also have an explanation of the variations that the same senile individual may present in the localizations of his own senility. These variations also will depend upon the variable nutritive activities which are the dynamic characteristics of each constituent part of the organism.

But not only temperament but also diathesis plays an important part in this respect. By this word we understand the disposition to disease. We may readily understand how important these dispositions are in the localization of a process which is the consequence of organic deteriorations. This is so true that in the absence of a close observation of the facts certain diatheses are often confounded with

the senile process, so alike are they in their external manifestations. It is, furthermore, in this conception of temperament and diathesis that we may explain why senescence begins at a different age in each subject, and not always at the same period of life. The reason for this is that the coefficient of the organic activities varies for each individual. Each individual, by reason of his lessened organic resistances, carries from birth a certain disposition to disease, that is to say, a special grouping of lessened organic resistances upon which depend the time of appearance of senescence, and the duration of this period up to the time when senility is definitely established. We now understand that, in the case of senile degeneration, we must take into special account these various factors, among which the age itself is far from always holding the first place.

Such is, broadly sketched, the conception of senility which seems to me to correspond most nearly to the actual facts in the evolution of the individual. I am convinced that these general notions will be of great utility to the physician, since they will enable him to take in at a glance the modifications that senility imprints upon the economy. His therapeutic efforts can only thereby gain in efficiency.

Anatomy of the Old Man.

In this chapter I shall study the histogenesis of the changes of texture which we encounter in senility, starting always with the idea of the evolution of the individual. These changes may be grouped according to three principal types: (1) Pure atrophy of the constituent elements of the tissues; (2) Progressive infiltration into certain tissues of organic or mineral elements foreign to their primitive constitution; (3) An exaggerated production of connective tissue.

Atrophy.

Before studying the modifications which may be encountered in the totality of any organ, it seems to me necessary to show what takes place in the elements composing this organ. These are what physiologists call the noble elements, because of their preponderating rôle in the accomplishment of the function of the organ, as opposed to the other elements of the organ which play but a secondary rôle, that of woof or support. What is the place of this element in the organism; what rôle does it fulfil; what does it represent in a biological point of view? First of all we have to regard it as an element of the living being arrived at an advanced degree of differentiation. But while differentiation has caused it to acquire a

particular specialization, while it has acquired a more definite property, a superior quality, it has lost in its power of resistance; it has acquired a very evident fragility and it has been deprived in great measure of its property of self-preservation and regeneration. It is then devoted in advance to senescence and death, and that in spite of the conditions in which it is destined to live, even the best conditions for assuring its nutrition. Thus, as we have seen above, specialization has in a measure caused the primitive vital essence to deviate and has directed all its forces to a single and restricted end; in it, consequently, metabolism is in a measure reduced to its minimum, and can never compensate for the losses sustained in the process of functionating in which all the constituent parts of its individuality should concur. Since, therefore, its complete renovation cannot take place, the time will not be long delayed in which the income can no longer correspond to the output, and from that moment the element diminishes and shrinks, that is to say, it atrophies. For the sake of still greater precision I will take as an example the fat cell, in which the atrophic changes are most visible and consequently the best known in the different stages of their evolution.

If we examine a fat cell in process of atrophy we note first that the envelope is less completely filled by its contents; soon appears a fat droplet around which is seen a transparent liquid. This little drop divides into two, then into four, and so on. Those in which the fragmentation has longest continued appear in the form of true fatty granulations, spreading throughout the interior of the cell until the contents of the latter are purely granular. As the fragmentation of the contents of the cell continues its globular aspect changes; it becomes fusiform and its volume is manifestly diminished. Little by little the number of granulations is reduced, resulting in a proportionate reduction in volume of the element, which soon, when all its granulations have disappeared, resembles merely an ordinary connective-tissue cell. This may even disappear in its turn, after having undergone molecular fragmentation. Such are briefly the successive phases through which the fat cell passes in process of atrophy. We have even seen this atrophy go on to complete disintegration of the cell; and we shall see that the atrophy indicates the beginning of senescence of the cell. This period of senescence has continued, becoming more and more marked, until there has been a transformation into a connective-tissue cell; at this moment we may say that the fatty cell is dead, since there remains no trace of its proper differentiation and specialization. This is even a good example of death through loss of individualization (although there is a continuation of existence), consequently of transformation into an

organism possessing other characters, enjoying other properties, and adapted to other functions.

There is no element in the economy which cannot undergo atrophic changes; but the successive phases through which the atrophy is produced are much less easily recognized in the others. We know, however, in a general way that along with diminution in volume there is a parallel diminution of the nucleus; that the contents of the cell divide ordinarily into a multitude of fine granulations which are absorbed after the rupture of the enveloping membrane. In this latter case to simple atrophy, the first manifestation of senility, are joined other signs, marking a constant progression towards death; these are the degenerations the study of which will occupy us more at length soon. As a consequence of the atrophy of the elements, we note a diminution in the size and weight of the different organs.

Renovation of the Tissues.—Before leaving this question of atrophy, which is so frequent, almost constant we might say, in every period of normal senility, we must remark that the distribution of the atrophy is very irregular, not only in the economy as a whole, but also in each individual organ. In explanation of this fact we need only remember that in each organ all the constituent elements of the mass are far from living to the same age. There is an uninterrupted work of restoration of the elements; the older of them disappear and are replaced by other elements which have for a long time been maintained in a condition of less differentiation and consequently were less specialized. These elements have, therefore, sometimes for a very long period, a life closely approximating the primitive state and quite removed from the definitely specialized life with limited function; among them, consequently, wearing out by function could not take place. They constituted a permanent reserve charged with filling the vacancies continually occurring in the ranks of the cells having complete function. In proportion as the complete elements die and disappear the young ones are developed, so that there is a balance of compensation between atrophy of the worn-out elements and development of the new elements. This movement of partial renovation is an exact image in miniature of life in general. For we witness here, as it were, the birth of each element, its own functional life, its senescence, its senility, and its death. If we seek, on the other hand, for an explanation of the irregularity of distribution of the atrophy in different parts of the organism, we shall have to invoke the individual conditions which are the characteristic of the nutritive activities of each organism; and we know how these differences in nutritive activities determine varieties in individuals.

These varieties may be infinite, and although our methods of investigation are pushing back each day the extreme limits which hide from us the modifications of the cell, we are not yet prepared to determine the number of different modes of being which each single cell may present, or even to guess at them. We know, indeed, that the same cellular elements may manifest diverse activities, although histological examination or even chemical analysis does not permit us to detect the slightest differences in constitution, but this does not mean that these differences do not exist. The least modification in the grouping of the constituent parts of the cell no doubt suffices to bring about a change in its reactions and in the manifestations of its functional activities. Chemically there is nothing altered in the ordinary proportions of its component parts; physically there may be neither a decrease nor an increase in the number of its constituent parts; and yet it no longer reacts in the same manner. Two cells may also react differently, although chemically and physically they appear identical; dynamically, however, they have changed. It is certainly by dynamic manifestations, very variable in themselves, that the elements mark the first degree of their fatigue, of their wear, which is for us a commencement of senescence. The exhaustion of the coefficient of resistance, which is not renewable in its integrity, provokes alterations within the cell which thenceforth act differently. These differences in the functioning of the vital activities determine an alteration in the properties of the molecules and of the element.

In man senile evolution may produce important dynamic modifications in one or several organs; the vital activities are no longer the same. If the difference is too great to permit of the preservation of the relations with other functions, there will be a perturbation in the economy and disease will result. If the relations are maintained in consequence of identical alterations having occurred throughout the organism, life will pursue its course with the vital activities progressively diminishing. This will be senilization leading to senility by which the organism is gently conducted to death. But of course we cannot assume that the phase of dynamic modifications can continue indefinitely without producing other more tangible modifications. With these modified vital activities molecular changes will soon become more and more manifest; this is especially so in the case of atrophy, which is the condition we shall study first, since we must remain in the beginning outside of pathology.

We are therefore warranted in regarding atrophy as an anatomical process of senescence, and the irregularity of its distribution is explained very naturally by the inequality of cellular resistances. This inequality is itself dependent, on the one hand, upon the primi-

tive impulsion which characterizes the power of attraction, and on the other, upon conditions of the medium and of the life of the cell which impose upon it very different modes of being. But in other cases, either because there exists a pathological soil or because the elements in question have very precarious functions, or because they are in a medium which renders these modifications possible, not only is simple atrophy produced, but we see also more tangible alterations appear in the cellular elements through the introduction into their substance of organic or mineral particles which are foreign to their ordinary constitution. These changes are degenerations.

Degeneration.

The alterations in texture to which I allude are three in number, namely, albuminous, fatty, and calcareous. These transformations are a part of the senile process; they indicate different degrees in the senilization of the elements. Once more, in order not to be obliged to come back to it, and to reply in advance to the reproach of confounding senility and disease, let it be understood that we must not look upon disease other than as a rupture of relations previously harmonious, while in the study which we are now pursuing of senility we have in view the analysis of the phases through which cellular elements pass in order to reach natural death.

Albuminous Degeneration.—In the first stage of this transformation we find the appearance, within the cellular element, of fine gray granulations, of proteid nature as chemical examination shows us. Little by little these granulations invade all the protoplasm, and conceal the nucleus or even disintegrate it. The cell increases in volume; the enveloping membrane may even rupture, allowing the contents of the cell to escape as a granular detritus.

All the tissues may undergo albuminous transformation, and under its influence we see the organs increase in volume, and, in the case of the normally transparent organs, present a very marked opacity.

Fatty Degeneration.—This may follow the albuminous transformation or appear as fatty degeneration from the start. It is without question the most frequent form of degeneration.

We shall follow the phases of this transformation in the normal evolution of the epithelial cells of a sebaceous gland; for a more detailed account the reader is referred to the various treatises on pathological anatomy. Anatomically the first stage of fatty degeneration consists in the appearance within the cell and around the nucleus of fine granulations; the centre of this mass refracts light strongly,

so that it appears to be surrounded by a dark circle. These granulations increase in number, fill the entire cell, and conceal the nucleus. Little by little the granulations fuse with each other, and so become more voluminous, while their number is proportionately decreased. They thus fill the cell with droplets of oil, and these unite until finally the cell forms but a single drop, the future of which varies according to the organ in which the element is found.

Fatty degeneration occurs in defective nutrition, and this transformation forms one of the phenomena of cadaveric decomposition. We ought then to expect to meet with fatty degeneration among the changes peculiar to senescence; and I have already several times insisted upon the value of this transformation, which is very probably a product of division of albuminoid matters which have been incompletely oxygenated. These facts lead us to place fatty degeneration among the secondary modifications of senescence, and we must not forget that the stage of steatosis will be observed in the cellular element only from the moment in which the vital activities have been sufficiently depressed to no longer suffice to assure the organic changes upon which oxidation depends. All the organs may be affected with fatty degeneration, and we may readily understand what general disturbance would follow the localization of this process in an organ such as the liver or kidney. We need not show that from this moment we no longer find ourselves in the presence of senility, but that we have to do with a definite disease which is engrafted upon the senile process in consequence of this localization; the latter is due to various influences which we must always search for with care.

Calcareous Degeneration.—We often find in post-mortem examinations on the aged hard products, true incrustations of the tissues by the products of disassimilation. These concretions are due to deposits either of lime or magnesium salts, or of urates. We shall not consider here the latter, which result from a frankly pathological process.

The calcareous salts (carbonate and phosphate of lime) may be deposited in all the tissues; but they show a preference in a measure for the dead tissues. We find them in tuberculous, caseous masses, but they may also be found in all the tissues in which degeneration has occurred. We consequently find calcareous deposits, although sometimes very slight, in almost all old people. It is difficult at first to recognize with the naked eye the early stages of calcification; but when in a more advanced degree, it appears under a double aspect: the tissues are crusted; they become hard and present a resistance to the scalpel, or they form a fatty mortar which can be crushed between the fingers, giving a sensation of fine sand.

Talamon and Cornil and Ranvier, who studied this process histologically, have shown that calcification requires for its production a special modification of the connective tissue. This would place calcareous incrustation among the secondary modifications of weakened nutrition. Thus it forms a part of the senile process, although indirectly.

Xerosis and Sclerosis.—We shall have to consider this manifestation of senility somewhat more in detail. More frequently than atrophy or even than fatty degeneration, we find in the aged a production of sclerous tissue. I hope to show that the sclerous degeneration of the tissues is a part of the senile process and that its production requires no other explanation than that of which I have already made use in describing the genesis of senility. I shall endeavor to show that the development of connective tissue is simply a phenomenon of senescence and not a pathological manifestation.

Hallopeau calls attention to the fact that sclerous degeneration was for a long time confounded with chronic inflammation. He recalls the well-known works of Gull and Sutton, of Debove and Letulle, of Peter, Lancereaux, Duplaix, Huchard, H. Martin, and others who have contributed to our knowledge of the production of sclerosis consecutive to a vice of nutrition. But all these authors regarded sclerosis as the result of a defective or impeded circulation, and all consequently regarded it as solely connected with arteritis. Finally, we may mention the opinion of Ziegler, who regards sclerosis as a form of hyaline degeneration, localizing itself in the arteries and bringing in its train dystrophic troubles. We may describe the views of these writers in a few words. They hold that arterial lesions are necessary to produce sclerosis, or, more simply, sclerosis is a result of arteritis. Let it be understood once for all that I am speaking of the sclerosis of old age, and that I leave aside all consideration of diseases which may cause the more or less localized production of sclerous tissue, such as the different forms of inflammation or organic troubles whose final term is visceral sclerosis.

There can be no question of the existence of a visceral sclerosis following an arterial lesion which causes diminished nutrition of the organ; this has been well shown by Huchard in his well-known work on the diseases of the hearts and vessels. But I am forced to disagree with this writer when he asserts that arteritis is the necessary cause of sclerous degeneration. We know that the cycle in senile sclerosis is thus explained: the blood is changed primarily by two causes, one the consequence of disturbances of hæmatosis, and this brings us back to the theory of Réveillé-Parise, the other resulting from troubles of disassimilation. The vitiated blood acts upon the

vessels of smallest calibre, the arterioles and vasa vasorum, and provokes arteritis; this in its turn diminishes the nutrition of the organs. From this double cause—organic change and functional trouble of the vascular system—arises dystrophic visceral sclerosis. This is the arteriosclerosis with its modalities so completely described by Huchard. Clinical observations as well as histological examination confirm all the facts upon which this theory of sclerosis is based; but as regards the genesis of this trouble the theory deserves the criticism which I have made of it.

I shall not return therefore to the part which is attributed to disturbances of hæmatosis. But we must insist more upon the importance of toxic phenomena as a cause of arteritis. I have already said how strongly I believe in the action of toxæmias in the production of arteritis. The experiments of Bouchard have shown that the pathogenesis of certain forms of arteritis, of hitherto unknown cause, is due entirely to phenomena of autotoxæmia. I have also had occasion in various publications, especially in my study of the cardiac lung and in a memoir on the senile liver, to show the etiological rôle of arteritis in the production of sclerous tissue in the liver and in the lung. I understand, therefore, and readily admit the importance of arteritis in the production of dystrophic sclerosis, but I cannot conceive of it other than as a pathological condition, and shall always regard arteriosclerosis as a disease. We cannot, however, consider it as constituting senility; it is truly only a disease of old age, which assists powerfully in rendering this state more dangerous. There can be no question that senility is rendered more fragile and its evolution is accelerated by the occurrence of arteriosclerosis; it will hasten the death of the old man, and we shall see the great part which it takes in dissolution in the aged. But it must be reaffirmed without hesitation that arteritis and arteriosclerosis belong to pathology pure and simple, and not to senility.

How then can we explain the production of sclerous tissue in old age while adhering to this conception of senescence, which regards it as a normal period of existence and not a pathological condition? We must return to what I have said regarding the rôle of the primitive connective tissue in the economy. I regard it as representing in the organism the least differentiated tissue and consequently that in which the power of attraction has been preserved in its highest degree. We find this tissue in all the organs, in which it serves as a framework for the support of the noble elements; we know that it fills in a way all the intercellular spaces.

I need not here discuss the question of cellular specificity (Bard), and I shall study connective tissue only in regard to this function

which consists in filling spaces left vacant by the death of the noble elements. However, the supply of connective tissue in the organism is far from being unlimited; the losses which it undergoes in fulfilling its function have fatally a limit, and when this is reached it can only be differentiated in the direction of fibrous tissue, with a much more restricted power of attraction. It is from this moment, in which the connective tissue begins to form perfectly and clearly specialized fibrous tissue, that senescence begins for the organ and that sclerosis is established, determining a faulty physiological functioning, the retardation of which throughout the economy cannot be without influence on the more generalized troubles.

We see already how, in regarding senescence as a normal phase of evolution of the individual, we can explain sclerous degeneration. This is recognized by all authors, but all are by no means in accord as regards its interpretation.

If H. Martin and Huchard have been unable to arrive at other conclusions than they have, it is because of their premises, which differ from mine. They both study a pathological condition, and they are fatally led in their pathogenic researches to disease as the sole point of departure. Visceral scleroses, they say, are under the dependence of vascular lesions. Arteritis, in its turn, is due to the changes in the vasa vasorum, or the vessels of smallest calibre—arteriolitis. As the latter is a lesion, it seems difficult to believe that it could be due to any other cause than a pathological condition, and this pathological condition is found in the blood. One thing which seems to support this conception is the constantly increasing importance in pathology which the toxic forms of arteritis assume. Other authors invoke the preponderating influence of diatheses, which they regard as pathological causes, without remarking how this word is turned from its true signification, so well established by Bouchard; for instead of regarding them as the characteristics of vital activities, they look upon them as diseases with localization in the arteries. It is thus that we find in the list of causes of arteritis all forms of intoxication, which is legitimate, and all the diatheses, which is less so. A diathesis is merely a predisposition to disease; the production and the localizations of the latter, even in their first manifestations, are in the domain of pathology. That which diathesis gives is a diminished coefficient of resistance, a diminution in vital activities; there is consequently a more rapid exhaustion of the reparative power and a diminished resistance to degeneration, as regards the elements with active function. It is thus that sclerous degeneration has been explained; but this is always a pathological sclerosis.

I return now to the non-pathological field; a few words will suf-

fice to describe the normal evolution of sclerosis in senility. The active elements lose little by little their power of repair; they become atrophied. Connective tissue is developed, since its power of attraction is preserved, and it fills the vacant places and becomes differentiated into fibrous tissue. There is here a simple sclerous degeneration, as there was simple atrophy or fatty degeneration. In other words, connective tissue being the least differentiated tissue, it undergoes a slower evolution. This is the reason why it dies or degenerates very slowly; its coefficient of resistance gives it a very long life, and it may develop normally without interfering for a long time with the functioning of the noble elements.

There exists, therefore, a sclerogenesis, which is in a measure functional. It is manifested by the production of a very large quantity of intercellular connective tissue, by a more or less generalized and uniform thickening of the connective framework of the various organs. It may consequently declare itself normally, without there being any necessity for our invoking a pathological cause, in all parts of the organism in which connective tissue is normally found. It is an evolutionary sclerosis.

Let us recall the structure of the vessels of smallest calibre, those which are formed by a single layer of endothelial cells, resting upon a fine layer of connective tissue. We may readily see the effect of this normal sclerogenesis on the vessel; a thickening of its walls will take place. We have here in this organ so reduced, as it were, a lesion all formed, and we are not so far removed from what has been described as the ordinary alteration of the smallest arteries; and all the more as the endothelium will not bear for a long time, without suffering from it, this modification of the layer upon which it rests. This is precisely the arteriolitis of H. Martin, the change which he has so well studied in the vasa vasorum; this may in its turn give rise to atheromatous plaques in a vessel of larger size. But here we must stop; we are no longer in normal senility; we here have a perfectly developed disease consequent upon senility.

I believe that the initiation of senile arteritis has no other primary cause than the sclerogenic process which I have just described as one of the normal manifestations of senilization; and to prove this opinion I have only to recall the findings at autopsies on the aged. These autopsies show that, arteritis of pathological origin being excepted, sclerosis of the arteries in a very old person is often a modification of slight importance, producing organic changes of mild degree, and even permitting a regular functioning of the economy. Another fact follows from these post-mortem findings which is of value in the argument that arteritis may be a non-pathological condi-

tion in old age. It is that the presence of generalized arteritis is far from being always in direct proportion to the age, which it ought always to be if arteritis and arteriosclerosis were the cause of senility. We must, therefore, conclude that the production of a sclerous degeneration is normal in senilization, and we may even add that this sclerogenesis is capable of becoming the point of departure for arterial lesions, which will provoke in their turn the troubles so well studied under the name of arteriosclerosis. But it seems to me that it would be a misunderstanding of the senile process in its entire essence to place senility under the dependence of arteritis. The latter should be classed among the lesions of old age, just as hepatic, renal, cardiac, or medullary scleroses. I have, in support of this belief, the results of the examination of many senile organs (lungs, liver, heart), in which the development of connective tissue apart from any occurrence of arteritis is most evident.

Thus, when the connective tissue begins to lose a part of its power of attraction and differentiates, it becomes fibrous tissue. This fibrous formation pushed to its extreme limits comes in contact with the fibrous formations which pathology has taught us to recognize, without, however, becoming confounded with them. Indeed, restricting ourselves to the study of a single apparatus, we have seen how evolutionary arteriolitis differs from arteriosclerosis, if not as regards the material lesion, at least as to the symptomatic manifestations and the biological signification. The one is the anatomical substratum of a disease, the other is a simple physiological state of being. However, up to this time no author has differentiated these two processes one from the other. Far from separating them they have, to use an expressive term, lumped them together under one denomination, namely, sclerosis; and this of course leads to confusion.

The vocabulary of science is already so overburdened with terms that I have hesitated a long time before daring to give a new name to this variety of sclerosis. Nevertheless, it forms a type so distinct that it has seemed to me impossible to leave it with the same name as organic modifications essentially different. This physiological, evolutionary senile sclerosis I propose to call henceforth xerosis (from the Greek ξηρός, dried or hard). We shall understand then in the future, under the name xerosis, no longer a pathological sclerosis, but the normal sclerosis of senility. It will be encountered constantly in the senile organs, the changes in which we shall study later.

Physiology of Senility.

In this section we shall show that there is always a constant and proportional relation between the function of the senile organs and the degree of the senile modification of these organs. Let us see what are the relations existing between the organic changes and the physiological functions. In a general way we may say that it is the diminution of functional activities which constitutes the characteristic of the senile process. It is very evident, if we take a special cell and seek to establish the balance of its functioning, that we must take a particular account of its condition of development. During all the formative period, the vital energies being at their maximum, the functioning of the element will attain a very high degree, and this necessarily will become lowered in proportion as the element assumes its definitive characters. We may say, in order to sketch the evolution, that from that time during a certain period a special physiological function corresponds to a definite anatomical condition; but little by little, the coefficient of vital resistance becoming exhausted in consequence of the duration of the functioning and the diminution of reparative power, the element undergoes modifications which may lead either to the progressive diminution of its personality (atrophy) or to its total loss (degeneration and death). But at the same time that these changes in structure are taking place, and parallel with them, we note a modification in the function of the cell, characterized by a diminution of activity which may go on even to its cessation. We may then regard the diminution of function as the physiological characteristic of the senile process.

But it may be asked whether we can admit that the physiological functioning of the aged will be determined by the form of alteration of texture of the elements, and whether there will not be a special senile physiology according as there will predominate in the organs either atrophy of their elements or one of the types of degeneration which we have described. There is nothing in the present state of science which would forbid us to believe that simple atrophy, for example, ought not to modify the functioning of a cell in an entirely different way from albuminous degeneration. Not only is this hypothesis legitimate, but reason even leads us to regard it as of necessity; and since the anatomical modification brings with it necessarily a modification in the physiological functioning, in the same way the nature of the anatomical modification should have an influence upon the form of the physiological modification. We are thus led to formulate this proposition: each anatomical variety of the senile process

holds under its dependence a special form of the senile physiological functioning.

But nothing can actually give any precise information as to the differences which should exist in the functioning of a cell affected with one or another form of alteration of texture. With even greater reason we cannot establish by any definite facts the symptoms of slowing of nutrition in atrophy as compared with one or another form of degeneration. Furthermore, we know that the different alterations of texture which characterize the senile process are found all together, in different degrees, not only in the same subject, but often even in the same organ, and that microscopical examination shows in the same section cells in different degrees of atrophy alongside of elements in full process of fatty, calcareous, or fibrous degeneration. Whence arises the difficulty, in retarded nutrition in the old man, of determining the part which each form of alteration plays.

I do not wish to stop longer in discussing this point, for this work must be kept within the domain of known facts and not of hypotheses, but it was permissible to state the problem. Possibly some day biological analysis will become sufficiently acute to be emboldened to seek wherein consists the difference of function of the cell, not only in the various degrees of atrophy, but also between this same period of atrophy and an entirely different period of some form of degeneration. Nevertheless, although the study of the special nutritive retardation proper to each type of alteration of texture is impossible, we ought to try to make note of the special mode of the slowing of nutrition which characterizes the physiological functioning in the senile process.

The characteristic of the physiological functioning in the aged is retardation. It seems, indeed, when we consider senility from a sufficient distance, that there is an evident proportion between the activity of an organ and the alteration of texture which it has undergone in consequence of senescence. Even if we cannot seize precisely the moment at which the functional modification is sufficient to determine a physiological trouble, and even if it is not easy to determine at what moment an alteration of texture depending upon senilization is far enough advanced to produce a lesion, or at least when one may regard an old person as the subject of actual and advanced senility, it is easy to understand the relations of cause and effect between the organic changes and the functional modifications. The more the power of attraction is developed, the more and with the greater intensity are the functional activities exercised, and the instability, this fundamental property of living matter, is carried to its maximum; with the diminution of the power of attraction, the insta-

bility is lost at the same time that the functional activities are extinguished. All the functions participate in this general enfeeblement, and there is not a physiological phenomenon which, studied separately, does not give proof of retardation in the biological operations.

At first it will scarcely be possible to find the precise moment at which the retardation has become so marked as to be an evident symptom; but however slow is the progress of the change, it is certain and it progresses in a parallel line with the alterations in texture of the organs up to the point when atrophy or senile xerosis, consequent upon the diminution of reparative power, has brought about the diminution of instability, and consequently a march towards definitive stability and death.

The more differentiation and specialization have been developed the less is the resistance, and consequently the more rapidly will the deterioration show itself. It is necessary to insist upon this point in order to make it understood that differentiation is the less important as the function is less specialized and more general. Thus we shall find organs presiding over certain functions more resistant and less rapidly affected by senescence; that is a primary cause of difference in the degree of senilization of the organs. If we examine the differences between the senility of the cerebral function, which is so specialized, and that of the digestive function, we find that it is rare that the old man can make very active use of his brain. In any case he scarcely utilizes it at all to learn; he does not retain new facts and lives almost entirely in those previously acquired. His digestive tube, on the contrary, continues to discharge its proper functions, and despite a slight diminution, which is manifested especially when an increase of function is accidentally demanded of it, it continues to preside over the elaboration of assimilable products in a manner entirely sufficient for the maintenance of life. Thus in the aged we see inequalities in the manifestations of organic and functional senility, and these inequalities will be in relation with the rôle played by the organs and their function in the organism. This is also a result which we ought to expect after what has been already said of the senile process. Let us see, indeed, the primary modifications that are met with in the organs before the alterations are sufficiently accentuated to constitute a pathological entity. These may be summed up in two words, atrophy of the noble cells, and development of connective tissue. These alterations in structure will enable us to guess all the functional modifications that we shall have to study in the aged. Here I limit myself simply to a general view of the subject, insisting only upon the main characteristics of the physiology of old age.

There is in the Charcot-Bouchard-Brissaud "Traité de Médecine" an excellent study of Le Gendre summing up our present knowledge concerning nutrition. I shall review this briefly. Nutrition may be divided into four principal acts: (1) The putting the cell in contact with the nutritive elements, and (2) the phenomena by which the cell draws nutrient material from this medium—this is assimilation; (3) the metamorphoses through which the assimilated products pass in order to give to the cell the substances of which it has need—this is disassimilation; (4) finally, the phenomena of expulsion of the non-assimilated substances, and the waste of the intraorganic combinations produced by the disassimilation.

We must see what are the changes caused by senescence in these various acts of nutrition and endeavor to detect the order in which each one of them undergoes its most important modification. This will be the surest means of arriving at a conception of the way in which functional modifications are produced in senility.

If we will recall the biological conception of senility which I have described, it will be evident that the function which is most immediately in relation with the reparative power of the cell is that which will be first affected as soon as senescence occurs. It is, therefore, assimilation which, of the four acts of nutrition, finds itself first affected; thenceforth we enter into a vicious circle from which, assisted by nature alone, the subject will never be able to extricate himself. Indeed, if on the one hand the reparative power of the cell is diminished, and on the other hand and parallel with it, the elements of repair tend also to be furnished by the cell in smaller quantity, the repair of the losses caused by functioning can no longer be assured in its integrity, and, as a natural consequence, we can conceive that there will be a diminished resistance to atrophy and to connective-tissue transformation, which latter, in becoming more marked, will reduce still further the conditions of integrity and the chances of repair.

It is this which leads me to regard senility as constituted solely in the beginning by a disturbance of assimilation, the first cause of which is a diminution in the coefficient of the vital activity of the cell; the latter assimilates less, because there has occurred in it a diminution of the power of maintenance and of renovation, or, in other words, because it has lost its power of repair. With the diminution in the assimilative power we shall find, as a necessary consequence, modifications in disassimilation. The difficulty which the cell finds in drawing from the surrounding medium the necessary elements for its repair or maintenance causes necessarily a certain inertia in the phenomena by which this same cell transforms the materials which

are brought to it; this insufficient transformation leaves in its turn more waste, more residue to be expelled, and we know how much less utilizable incomplete oxidation renders the assimilated materials, and how much more dangerous are the accumulated waste products. Here are two new causes of profound modifications, and these are much the more formidable, for they place the period of senility in constant danger of disease; it is their presence which contributes most to cause senility to be regarded as much nearer a pathological than a physiological state.

With these incomplete oxidations appear accumulations of fat with their consequences upon the general functioning; the transformation of acids will henceforth be effected only incompletely, and I need not insist upon the pathological results which will flow from this. They explain those forms of senile rheumatism which were long confounded with gout, both morbid conditions recognizing as their cause precisely an incomplete transformation of acids in the economy.

As soon as the relations between wear and repair are broken, senescence becomes an undeniable fact. It will each day become more accentuated, and in proportion as the power of attraction already so diminished by specialization becomes incapable of restoring the worn-out parts, the function of each organ will cease to operate in the conditions which were the characteristic of it in adult life. It is needless to say how difficult it would be in the beginning to show in what exactly these differences consist. In order to do so we should have to possess an absolutely correct notion of the physiological actions and reactions of the period that we might take as a standard for comparison; and we do not even know what the functional manifestations might be which we should have to take as our standard. There is not a single physiological operation concerning which our facts are precise and undeniable. We must not forget that each function, even while remaining what it has been agreed to call normal, undergoes variations within very wide limits. I could not then pretend to say in what the first functional manifestation of senility consists. This new state of being of the organism instals itself imperceptibly, and when the physician is in a position to recognize it I regard it as certain that senescence is then already an accomplished fact, and that the subject under observation will have already passed through several stages of senilization.

Diathesis.—But here I ought to stop, for I have finished the description of the modifications of general physiological functioning due to the senile process. I have endeavored to show on broad lines in what the retardation of nutrition due exclusively to senilization

consists, assuming that it takes place in a subject free from every constitutional taint. But such a case, without being exceedingly rare, is unfortunately not the rule, and I am obliged to say a few words concerning senility when developing in a soil already prepared for disease. That brings me to speak once more of the relations of senilization with diathesis and disease.

We must adopt frankly the definition of Bouchard and regard a diathesis as "a permanent trouble of metabolism which prepares for, provokes, and maintains the various diseases as regards their symptomatic forms, their anatomical seat, and their pathology." It is easy to understand the favorable conditions that the senile process will find when it develops in such a soil; but we may also see the inevitable confusion which will arise when we seek to distinguish what belongs strictly in each individual case to diathesis and what to the senile process. In the case of a diathesis we have a permanent disturbance of metabolism, and we may easily understand the consequences of this trouble as regards the genesis and evolution of diseases. In the case of senility the conception is the same, and as soon as it begins to develop we find also a permanent trouble of the nutritive exchanges with all its consequences as to the production and the future course of diseases.

Senile Rheumatism and Gout.—But what justifies the necessity of bringing out into bold relief the various troubles due to a slowing of nutrition special to senility is that in many cases the latter develops upon a soil prepared in advance by heredity for all the disorders that the diathetic retardation of nutrition may cause in itself. Let us see what takes place in the case of retarded nutrition through diathesis: The process of oxidation remains incomplete; the transformation of the acids of the economy is not fully accomplished, and as a result of this appear diseases as distinctly characterized as are ordinary gout and rheumatism. In the work of Bouchard already referred to this important question will be found treated of in all its details; here I must limit myself to the application of these facts to the study of the changes that the introduction of a diathetic element may effect in the senile functioning. If the senile process acts upon an organism already predisposed by heredity to nutritive troubles, we may easily understand that there will result a number of phenomena preserving all the characters of the changes due to retarded nutrition, but presenting also in their mode of evolution differences sufficient to give them a rather special aspect. In the classical lectures of Charcot on the diseases of old age we may readily find a complete study of the nature of senile rheumatism and gout. In this latter affection the diathetic retardation of nutrition is able to cause the

disease by itself; in the case of rheumatism, however, it would seem as though the diathesis had not sufficient power to provoke at once a perfectly well-marked disease and that it required in some sort the aid of the senile process. From this double cause, diathesis and senility, could alone arise the troubles which constitute senile rheumatism. This is so true that in normal senile cachexia, which seems to be entirely exempt from any diathetic taint, we shall find but a very slight and incomplete sketch of the alterations which will be found earlier and much more marked if to the senile process is added an impulse given by the diathetic influence. These are the cases of normal senile cachexia which we must regard solely as physiological manifestations due to modifications in the texture of the organs, these modifications having themselves no other cause than the loss of the coefficient of vital resistance consequent upon the progressive deterioration of the power of attraction.

These examples are not very rare; it is sufficient to walk through a home for the aged to see that quite a number of the inmates bear cheerfully and without appearing to be specially worn out, years far beyond the ordinary; the nonagenarians are far from being rare and almost always they are the old people who are in the best health. However paradoxical it may appear, we may say that the oldest, the very aged, are those who appear to be the youngest old men. This result is due to the reason which I have endeavored to bring out most prominently; in these old men there is no other cause for their senility except the senile process itself; nothing beyond the simple wear of the organic functions has come to increase the loss of their coefficient of vital resistance or to diminish the power of attraction of the elements in their organs. Under these conditions senescence has been effected very slowly, without any very intense perturbation coming in to disturb the neighboring functions or to bring about a rupture of equilibrium in the general functioning. The disturbances of oxidation or of metabolism, although real, are so slight, so feeble, that the morbid manifestations produced by them are almost nil; a very long time is required to bring them to an appreciable degree, and in this way is explained the integrity, truly remarkable, of the general health in the extremely aged. Transformations due solely to a long exercise of vital functions are so regular, they are produced so insensibly, that the equilibrium is never overthrown and there is a constant relation between income and output. But let the soil, on the other hand, be already prepared constitutionally, and senescence will give a definite impulse to the latent morbid condition, and the two efforts combined will produce disorders due both to senility and to the diathetic cause.

Precocious Senility.—It is under these conditions that the signs of precocious senility are manifested. We may say that whenever we find ourselves in the presence of an important manifestation of retarded nutrition we must be very reserved as to the prognosis of an accidental or surgical traumatism. We must, for this reason, always examine very attentively an old person when we are called to give advice as to a surgical operation. It need not be feared in the normal old man, but we must be more timid when the senility has developed on a soil of which we are not sure.

To conclude: Senility has for its first manifestation a disturbance of nutrition in which there are two acts. Assimilation and disassimilation are the first and the most profoundly affected. This trouble creates for the organism a morbid imminence which increases in an important degree the insufficiency of the expulsion of the organic residue. As soon as the retention of these matters is an accomplished fact, it constitutes a determinate morbid state which belongs no longer to senility regarded in a general sense.

Causes of Senility.

After having established the place which senility occupies in the evolution of vital phenomena, and after having shown the organic and functional modifications which are its characteristics, it will be very useful in a practical sense to study the causes which determine or hasten senility. The causes of senility! These are words which might occasion surprise, for it would appear at first sight that age is the sole cause of senility. Let us analyze the value of this etiological factor.

I have already said that length of years is not the sole cause of old age, and I added that it was indeed far from being the chief cause. Nevertheless, in a discussion of the causes of old age it is inadmissible not to give an important place to years, since the accumulation of years remains apparently the only appreciable and tangible cause of the organic and functional modifications which constitute the senile state from a biological point of view. I must defend an expression which might be thought to have escaped me involuntarily and which might seem to be an exaggeration. I have just said that age is "apparently" the only external cause of senility and even of death, and I might be thought to hold too cheaply the etiological value of length of years. I will retain the term, but we must make a certain effort to rid ourselves for a moment of current ideas concerning old age and recall the new views under which I have sought to describe this period of life.

How does the living being normally arrive at death? I think I have shown that death occurs when the coefficient of vital resistance special to this individual has been worn out. And we have seen also that one of the principal causes of this exhaustion is the use of the function under conditions which do not permit of a repair equal to the wear; and, as a necessary consequence, the length of time during which the living being may carry on this functioning is proportionate to this coefficient. As a proof of the correctness of this view daily observation has frequently determined the age at which death arrives for a number of species of living beings; the period of involution has also been fixed, and old age appears precisely between these two limits. Consequently separation from the period of birth, mere living during a longer or shorter period, is growing old. But it is also lasting; it is acquiring age; and we may readily conceive how easy it might be to establish a confusion between these two expressions. But really it is not years which are the cause of old age; the number of years of life is under the direct dependence of the coefficient of vital resistance, as also the gradual and normal or accidental and irregular wearing out of this same vital resistance. It is precisely and solely in this last case that age may become a real pathogenic factor possessing interest for the physician, since its influence will make itself felt all the sooner as the occasional causes of decrease of vital resistance will be superadded to the duration itself of life.

Such are the ideas which we should hold on this subject; but in order to avoid too long and too frequent digressions rendered necessary for the clearness of description, we shall retain for the number of years, the age of the subject, the pathogenic rôle which has been accorded to it.

This opinion, furthermore, is not new. A popular dictum expresses exactly the same idea when it says that one is as old as he seems to be; this expresses the belief that the sum of years which have been lived should not be charged to the account of the years which remain. Under a more medical form Cazalis has written, "One is of the age of his arteries." By this the writer has wished to show that for the exact appreciation of the degree of wearing out of the coefficient of vital resistance, we must take less into account the number of years of the subject than the state of his circulation, which state was regarded by the writer as the criterion of health.

But if from an absolute point of view the age, that is to say, the number of years lived, is the only explanation of old age, is it also from a medical point of view? Rarely. And, leaving aside the exceptions which the necessities of existence in the present constitution of society render more and more rare, we may reply that in addition

to age, numerous causes of exhaustion of the coefficient of vital resistance become more and more important each day in the determination of senilization, and that the latter becomes more and more rapid in its course. This follows logically from the biological definition of senility and death; both are naturally and so much the more precocious as the exhaustion of vital resistance is more easy. We shall find then among the causes which hasten or provoke senility all those factors which determine a permanent disturbance of nutrition, and consequently a diminution of the coefficient of vital resistance. I shall divide these into two categories, namely, the diathetic and the acquired causes.

Diathetic Causes.

I think it will be well to return once more to this long-disputed question of diathesis. If I attach a great importance to the study of this question it is because my observation of senility, made on a great number of old people, brings me each day to the conviction that the constitutional perversions hold under their dependence a greater or lesser number of years of the life of a man. In other terms, the duration of life of a man is longer the more free the subject is from hereditary or acquired taint. At first sight this proposition seems puerile, and if there is any utility in formulating the law it is because it seems hitherto not to have been sufficiently brought to the front; the diatheses are indeed scarcely made use of except in the etiological study of the lesions which complicate senility. We must study the question more profoundly, and we should apply ourselves to a search for the rôle which diathesis plays in the development of senility.

For this it will suffice to compare the definition of diathesis with our conception of life. I have adopted the definition of Bouchard and say with him that diathesis is a permanent trouble of metabolism which prepares for, provokes, and maintains different diseases as regards their symptomatic forms, their anatomical seat, and their pathology. It has been proposed, in order to simplify the definition, to say that diathesis is a morbid temperament. It seems to me possible to amplify this wholly medical and clinical definition and adapt it to the biological point of view in which we placed ourselves at the beginning of this study of the senile processes. We may ask what is a permanent trouble of metabolism from a biological point of view. It is evidently a mode of being of living matter in which the power of attraction is modified, plus or minus, which in the last analysis means simply a diminution of the coefficient of vital resistance. Now it is to this diminution of vital resistance that we must refer the

principal cause of senescence and death. Diathesis, therefore, ought to be placed at the head of the causes which hasten or provoke senility.

It might be objected that this interpretation rests upon merely a definition of diathesis and that it is a little too exclusive. This objection is not well brought, for if we examine all the definitions of diathesis we shall see that while they may present among themselves some differences from the point of view of their pathological application, or even have different values in the classification of pathological states, we shall not find one which from a biological point of view does not imply the idea of a diminution of the coefficient of vital resistance. Whether we interpret it in the sense of a morbid temperament and of a predisposition to certain diseases, or whether, with Grasset, we regard diathesis as an already developed disease, we shall, nevertheless, arrive in the last analysis at the idea that diathesis is the result of a diminution of the coefficient of vital resistance, placing the organism either in a definite condition which will constitute disease or in an indefinite state which will represent predisposition. Thus whatever is our conception of diathesis from a nosological point of view, it dominates biologically the pathogenesis of senility. There is a clinical proof of this which appears to me conclusive. It is that the most aged, and among them those who carry most cheerfully the weight of their years, are precisely those in whom careful observation reveals the fewest traces of an hereditary or acquired diathesis.

This is not the place to enter into a complete study of the diatheses, and it would be apart from our purpose to investigate the reasons which speak in favor of this or that classification of diatheses. I may, however, recall the fact that Lancereaux admits of only two diatheses, namely, scrofula and herpetism. Under the name of herpetism he understands the group of morbid conditions which Bouchard has called arthritism; he does not include in it, however, gout and acute articular rheumatism. Hallopeau recognizes three groups, scrofula, herpetism, and arthritism. Crocq the younger, of Brussels, admits of but one diathesis, in which he includes not only the morbid conditions that have been grouped under the designation of herpetism, arthritism, etc., but also a great number of other diseases. In his memoir he defends the thesis that these diathetic diseases are characterized by disturbances of nutrition of the tissues. He endeavors to prove that this nutrition is under the dominion of the nervous system; and he concludes from this that all these conditions are referable to a primitive nervous taint, grouping them, therefore, under the one title of nervous diathesis.

I myself agree with Bouchard, that there are only scrofula and arthritism.

It may be asked how these diathetic morbid conditions act to hasten or provoke senility. Before replying to this question it will be necessary to study somewhat in detail each of these two diatheses.

The Scrofulous Diathesis.—We do not know exactly in what this diathesis consists, for it is not yet possible to establish in a scientific way how the healthy organism differs from the scrofulous. There are, no doubt, chemical modifications, and the few researches which have been carried out to any extent have given results which constitute a strong presumption in favor of this opinion. Thus Bene found that in the bony tissue of a scrofulous individual there was 64.4 per cent. water, while normally the proportion is 13.6 per cent. There was, therefore, a lessened amount of calcareous salts, fats, and nitrogenous matters. But we are far from knowing in what proportion this reduction occurs in all the tissues, since we do not know the exact proportions which enter into the normal constitution of a given weight of the healthy human body, and naturally we cannot draw any comparisons in this respect with scrofulous tissues. Nevertheless, although we do not know the essence of scrofula, its study clinically is far advanced, and we can quite easily recognize the disorders which it determines in the economy, disorders which are sufficiently related with each other to impress a peculiar and very personal seal upon the scrofulous manifestations. It appears to be evident that the characteristic of scrofula is a lack of energy in the vital phenomena; in all parts of the economy there appears to be an engorgement of all the elements with lymph, which circulates sluggishly through the flabby tissues. These conditions are well calculated to affect injuriously the two great characteristics of living matter, namely, instability and the power of attraction, and therefore necessarily to condemn it to death through hastened senilization. Thus the economy finds itself unarmed in the face of morbid causes which assail it, and, very naturally, the door is open to numerous causes of general or partial infection. Each of these infections will in its turn play an important rôle in the disorganization of the entire structure. All the hyperæmic or congestive diseases develop upon this poorly defended soil and rapidly become permanent, constituting so many obstacles to the activity of the vital functions. Thus senescence occurs with more or less brief delay. And, indeed, we rarely see a scrofulous person arrive at a very advanced age; the characters of senility show themselves early in him, he will soon become an old man, and it is of such a one especially that people remark that he is older than his years. We find in all homes for the aged people to whom we give

seventy or even eighty years, and we are astonished to learn that they are not sixty, sometimes not even fifty years of age. It is scarcely necessary to add that such organizations are an easy prey to all morbid conditions of any gravity. Thus the scrofulous arrive quickly at a precocious senility and seldom reach a very great age.

The Arthritic Diathesis.—On this soil we are more at our ease. More typical in its clinical forms, the arthritic diathesis has been more carefully studied, and it is relatively well understood in its essence and is consequently more easy to characterize. Its general characteristic is a retardation in metabolism. Landouzy has proposed to substitute for the term arthritic diathesis that of bradytrophic diathesis, a good word that it would be well to preserve.

There exists, therefore, a group of pathological conditions in which observation discovers the common characteristic of a retardation of nutrition. Naturally the varieties are numerous, and the localizations may be very varied, and this diversity will necessarily create perfectly characteristic morbid conditions which are often widely separated one from the other; but careful observation will always detect one common trait which will be transmitted by heredity during many generations; that which is transmitted is the retardation of nutrition.

We find here once more a vice of general nutrition dominating the entire economy and resulting finally in a diminution of the reparative power of living matter. Under these conditions the machine will wear out more quickly than it can be repaired, and it is therefore devoted to a precocious senescence. We find frequent examples showing the incompatibility of the bradytrophic diathesis with a slowly advancing senility. Nevertheless, we may see many of these patients live to quite a respectable age, although always in the power of one of the pathological varieties of this diathesis.

There is in this fact an apparent contradiction which it is necessary to explain. We know in what consists nutrition in the normal state; a current of assimilation and of disassimilation is established in the economy, thanks to which the substances introduced undergo a destruction; in other words, the waste products are completely oxidized and so put in condition for being easily and rapidly eliminated by the emunctories. But whenever, through some permanent influence, there is either an incomplete elaboration or an insufficient elimination of incompletely oxidized products, there will be a retention of one or more of these products in the organism; there is no need of a long argument in order to convey an understanding of the fact that retention of each of these products will bring in its train special disorders, which will, however, vary among themselves be-

cause the agents of their production are different; different also will be the localizations in one or another organ, and different consequently will be the functional troubles. There may, therefore, be cases in which the bradytrophic diathesis is compatible with a relatively considerable amount of vital resistance. I may cite the case of a man who presented signs of a green old age without, however, being weighed down by his eighty-seven years; he had frequent attacks of hepatic colic, in two of which I was able to find the gall-stones in his discharges so that the diagnosis of biliary lithiasis was unquestionable. Furthermore, his antecedents were characteristic; his father had been gouty and his mother died of "suffocation" (emphysema, asthma, or heart trouble, which would indicate an arthritic diathesis); he himself had suffered from migraine in his youth, and then towards the age of fifty years had had his first attack of hepatic colic. These attacks, which at first were separated from each other by long intervals, gradually became more frequent, and he finally lost count of them. This patient was unquestionably the subject of a diathesis, and yet we find him arrived at a very advanced age without his senility ever having assumed that cachectic character which would indicate a profound organic deterioration. To those who might see in this case a contradiction of the opinion which I defend, namely, the importance of diathesis in the production of senility, it will suffice to remark that in the case which I have just reported the diathesis had limited its effects to one function, whose action in the economy is limited. The bile was certainly not normal, but its production was not entirely arrested and consequently it fulfilled its rôle, and the latter was interrupted only occasionally and for a rather short time. The diathesis would naturally, therefore, have but very slight consequences. Let us suppose, on the other hand, that this same man under the influence of this bradytrophic diathesis had had an unrecognized and untreated glycæmia; surely his decline would have been much more rapid and more profound and his senilization would have occurred much more quickly. He certainly would not have reached the age of eighty-seven years, for his glycæmia would not have permitted this; and, together with the symptoms of diabetes, we should have noted in him the stigmata of senility at an age which would have astonished us by its precocity.

From all this we must conclude that (1) the arthritic diathesis is a cause of senility; (2) according to the morbid form that it assumes it may provoke and hasten the establishment of a more or less precocious senility; (3) the less the diathetic process affects any general function the greater will be the resistance of the organism to senility; (4) the more the manifestation of the diathesis weighs upon a general

function the greater evidently will be its causal action as regards senility.

I cannot here enter into a detailed description of each pathological variety of the arthritic diathesis, or follow it in its effects upon the more or less rapid production of senility. We may sum up the action of arthritism by saying that the arthritic diathesis will hasten senility in proportion as it manifests itself by a more general affection. Thus gout, obesity, and diabetes hasten or provoke the apparition of old age much more than the other more circumscribed forms of arthritism. We must therefore endeavor, whenever we examine an old man, to detect the relation which may exist between the degree of senility which he presents and any diathetic symptom whatever. We must then look higher, and in the presence of any diathetic modification we must remember that the duty of the physician consists not only in treating this manifestation, but also in foreseeing what rôle it may play in the production of a rapid and precocious senescence.

Heredity.—A final word may be said here before we proceed to study the influence of other causes which may provoke or hasten old age. Doubtless one will be surprised not to have learned in what has gone before that heredity holds an important place among the causes which hasten or provoke senility; for it seems at first sight that this place ought to be a very prominent one. But it is only necessary to reflect upon the true meaning which we must attach to heredity, in order to recognize that it would be useless to discuss this subject. How are we to conceive heredity? We must understand by this word a biological phenomenon of transmission to the descendants of some characteristic of the generators. This definition will show us sufficiently that heredity plays no immediate rôle, properly speaking, in senescence. What does heredity transmit? Is it old age? Evidently not. What it transmits is solely the conditions of development of old age. It is, therefore, only secondarily that it can play any etiological rôle in senilization; this rôle is limited to giving to the individual a portion of the vital characteristics of the ancestors; the mixture of these characteristics will constitute the coefficient of vital resistance which belongs to the descendant, and it is in this coefficient that the true factor of senility resides.

Acquired Causes.

It is perhaps necessary to explain why I have preferred this term to any other which might possibly fit better the mode of action of each cause and agree better with the expressions of current usage in medicine. It would seem that it might have been more simple to

call this second class of causes of old age by the term infectious or toxic causes. The reason for my choice is not without importance. It is as follows: in the study of the senile process we must have constantly present in our mind the biological conception of life and the mode of production of old age and death; the latter consists exclusively in a diminution in the coefficient of vital resistance. Biologically we know by what procedure this coefficient may be reduced and disappear naturally, and we have seen how rare is this normal evolution of senility and of death. It was necessary, therefore, to search for the pathological causes which must necessarily exist, and I have shown that the permanent perversion of nutrition holds under its dependence the coefficient of resistance. This permanent perversion is explained in different ways: either the organism carries it at birth and it is then a diathesis, or the surroundings and habits, by the persistence of their effects, render permanent a perversion of nutrition which was at first momentary. It is this latter which I regard as an acquired cause. The modalities under which they may present themselves are numerous and varied, but among them the infections and intoxications deserve the first place.

Infectious Causes.—These are manifold and their mode of action is very varied. Some are permanent from the start, such as syphilis; they place the organism under permanent conditions of defective nutrition. Others, like tuberculosis, may sometimes attain this morbid modality, but more often they determine a true localized disease which destroys the patient after a rather long existence will have permitted the evolution of a precocious senility. At other times, finally, the infection is of only temporary duration, and it is itself conquered in the struggle to which it has challenged the organism. But the latter, severely wounded in the combat, will often retain an indelible mark of the assaults which it has received, and from this moment the nutritive changes will remain modified, either diminished or perverted. It is this that we commonly find after certain cases of smallpox, cholera, typhoid fever, or malarial infection.

What do we know of the pathogenic process of infection? In most cases, unfortunately, our knowledge of the true nature of the phenomenon is very restricted and the pathological process escapes us. Nevertheless, observation and clinical facts lend to each other a mutual support. If, for example, we do not know how syphilis acts in order to determine a vice of nutrition; if we are reduced in such a case to pure conjecture as to its mode of action; if, indeed, in this particular case we are powerless to determine exactly the essence of this infection, we are, nevertheless, in a condition to formulate a positive opinion concerning the permanent deterioration inflicted upon

the organism by this syphilitic infection, and we may appreciate the lowering of the coefficient of vital resistance which results from it and its influence on the precocity of the senility. It is rare to see a syphilitic person become very old, and many of the stigmata of chronic syphilis belong to the clinical picture of precocious senility. Observations are numerous of syphilitics in whom the signs of a permanent vice of nutrition have attained a degree which leaves no doubt as to their reality, and we know, for example, that obesity sometimes occurs in previously slender individuals who have suffered from syphilis of moderate intensity. We must, then, count among the causes which hasten or provoke senility the infectious diseases, whose slow course carries in its train permanent disturbances of nutrition.

What I have just said concerning chronic infectious diseases with permanent characteristics may be applied to infectious diseases whose action is temporary; and we must, in our etiological investigations concerning special cases of precocious senility, lay great stress upon the pathogenic rôle of some past infection which was severe though temporary. The mode of action in this case is not always the same; the infectious disease will have played especially the rôle of a disturbing agent, and the vice of nutrition will thenceforth be permanent, although there is no longer any of the pathogenic agent present. It is not rare, indeed, to see in children of a good constitution, born of parents in whom it is impossible to find the least diathetic taint, a simple measles become the point of departure for a nutritive deviation which will rapidly pass into scrofula, for example. Evidently, in many cases we may, with some show of reason, regard this as the simple awakening of a latent diathetic condition. However this may be, before the rubeolar infection the child had a satisfactory coefficient of resistance, but after the infection a disturbance of metabolism quickly lowered this coefficient and, by its permanence, ultimately favored the installation of precocious senility. Such cases are far from being infrequent. We must recall also the numerous cases of typhoid fever, the convalescence from which has been the point of departure for a complete transformation of the nutritive processes in the patient. Cases are sufficiently numerous of obesity beginning in previously slender persons during the convalescence from typhoid fever, and remaining as a permanant condition. We might prolong the list of similar cases; but as many of these would produce modifications the characters of which would resemble too closely complications, I prefer to leave the subject, in order not to be led into too long disquisitions. I may say, however, in conclusion that this power of modifying the nutritive processes resides in almost all the infectious diseases. The epidemic of influenza, from

which we have suffered for the past six years, has furnished a considerable number of cases belonging to this category, and many patients have, following even a mild attack of grippe, assumed within a year or two the appearance of being ten or fifteen years older than they are.

Toxic Causes.— Although the discussion is open, and will not be closed for a long time, concerning the intimate nature of the action of infection and the changes effected by it in metabolism, we are better informed when it comes to a question of non-microbic poisons. In a general way poisons determine a manifest deterioration of the organism and the nutritive changes are often thereby modified; these changes sometimes become permanent, and we find then again the essential condition which has constantly served me to explain the possibility of precocity in the appearance of the signs of old age. I will take, for example, alcoholic intoxication. We know what rôle alcohol plays in the production of organic deterioration; for the alcoholic the years count double and triple. Take, for example, an alcoholic subject only forty years of age, and analyze each one of his functions, observe his general appearance, study his resisting powers, and compare the results of this observation with those obtained in the examination of a healthy old man, and we shall see whether the advantage is not for the latter. Briefly, in the drunkard we find most of the perversions which are the characteristics of metabolism in arthritism. The proportion of urea in the urine is diminished as is also that of the chlorides, of the sulphates, and of the phosphates, and the same is true of the uric acid. We are able to follow the poison through the economy and its mode of action is almost definitively established. It seems certain that its effects are exerted chiefly upon the nervous elements, and it is through their intermediary that metabolism is interfered with.

Other poisons act with a special preference for other elements. Thus lead has a predilection for the red blood globule and the muscular element, although it does not leave unaffected the nervous system, and the result of its action upon nutrition in general is to provoke a fatty degeneration of all the tissues. In lead poisoning we note also a diminished excretion of urea, and the clinical signs of this intoxication are sometimes so like those of gout that writers have been led very justly to describe a saturnine gout.

These examples suffice to make us understand that an intoxication, when it leaves the organism the prey of a vice of nutrition, becomes actually a cause capable of provoking or of hastening the beginning of a precocious senility. Alongside of alcohol and of lead we must place phosphorus and mercury, whose influence is more

rarely observed, and in general all agents capable of producing a chronic intoxication.

Finally, among the toxic causes we must not neglect to place diet. This possesses an importance which may become very great in many cases. If there is an excess in the amount of food taken, general nutritive troubles will not delay in making their appearance and they will have as an immediate consequence a diminution in vital resistance; if there is defective alimentation the resultant loss of nutrition calls for no demonstration. And, finally, in a third case the alimentation, while in proper amount, may determine intoxications in consequence either of the quality of the ingesta or of their imperfect elaboration; in both cases a true intoxication is produced with the consequences which I need not again recount.

Nervous Causes.—We must first remark that this group of causes is much less strictly delimited than the two preceding ones. It is probable that as our knowledge increases concerning the exact rôle of the nervous system in nutrition and the primary causes of general and permanent disturbances of the nervous system, the limits of this group will be narrowed, and it will finally, in all probability, be resolved into the two preceding groups. However this may be, there are at the present time a certain number of morbid states which appear to be confined to the nervous system, and which affect it so profoundly that apart from the purely nervous manifestations there results a marked and pernicious action upon the general nutrition. This is the case in certain neuroses, such as hysteria and epilepsy, and psychoses. Above and before these we must probably place diathesis. Is it possible that some day we shall see in this modification of the nervous system merely the consequence of a disordered nutrition or of an intoxication, the mode and the agent of which escape us? For the moment we must be contented with affirming that there are certain nervous conditions sufficiently definite in their manifestations to deserve a place in nosological classification and at the same time sufficiently important to produce a general perturbation in nutrition and to depress the coefficient of vital resistance. Examples of this abound, and there is a well-recognized type of those who are called familiarly in the hospitals hysterical old women. They are ordinarily not very old in years. It is not necessary to describe the appearance of an already worn-out woman of this type; her face is tired-looking and seamed with long wrinkles, her hair is whitened, she is often toothless, and everywhere in her body we find signs of well-established senility. And yet this woman will often not have reached fifty years of age. In the insane the aspect may sometimes be even more typical, and in certain of them decrepitude is marked and early

in appearance. What has taken place? There has been denutrition through perversion or retardation of metabolism, and if we need a tangible proof of this permanent denutrition we may find it in an analysis of the urine; the urea will be diminished, and there will be marked modifications in the elimination of the phosphates and other elements, according to the variety of the nervous disease. It is in insanity that the clinical, physical, and chemical signs of precocious senility will be most marked. The physiological interpretation of this is very easy. Since the nervous system plays in the economy such an important rôle in regulating metabolism, it is very evident that a permanent trouble of the nervous system will produce a permanent trouble of nutrition.

Such are briefly the causes which hasten or provoke senility. I desire in concluding to remark once more how much the biological conception of the senile process has facilitated the study and interpretation of the conditions which determine the apparition of precocious old age, and how the latter is a matter of very great practical interest in medicine. It is a proof that studies which are very general and apparently widely removed from what directly concerns the physician, may be of great importance and of daily application in the practice of medicine.

Means of Combating Senility.

The utility of this work might well be questioned if I should terminate here the study of senility. I have said specifically that the object of this study was to arm the physician more effectually in his struggle against senility. It is in order to fulfil what seems to me to be the *raison d'être* of this article that I desire to devote a few lines to a study of the measures which hygiene and therapeutics offer us to attain this end.

To combat senility! There is nothing in this expression which may cause surprise; and to defend it I have only to recall once more that senility is simply a normal period of existence. But for those who still regard senility as a chronic disease which one is fortunate to bear with all its miseries and inconveniences, we must confess that the sense which attaches to these words cannot be very clear. We have seen that old age is due to two great causes, viz., (1) a diminution of the power of attraction of the constituent elements of the organs, and consequently (2) a diminution in the coefficient of vital resistance. In these cases of normal old age, unfortunately only too rare, the only etiological factor that the physician can invoke to explain senility is the duration of time during which the individual

has used his organism and has thereby brought it to the point of the complete disappearance of the power of attraction. But most frequently there exists some cause which hastens or provokes the appearance of senility. It is surely fulfilling the rôle of a physician to combat these causes of precocious senility. And one is strictly within the limits of practical medicine in searching for measures which will enable his patients to grow old more slowly, and to grow old better. These measures will not be solely applicable to precocious senility, they will be useful also in true senility, and we might have taken as a title for this chapter: "Study of the Means Adapted to Growing Old Well."

This is a science of which the physician has no right to be ignorant. It is indispensable that he should be able to teach his patients, for when he is called to see an old man, he may more than is usually believed be of great service to him, if he knows how to direct his old age and to teach him, as I have said before, how to grow old well.

But first we must ask what it is to grow old well. Two replies to this question suggest themselves. One of these is medical and biological, in which old age is merely the period characterized by the natural progress towards a loss of instability, that is towards death; this is the case in normal senility, and it is a conception which is admitted by every one in a general and vague way, especially if he has no idea of making an immediate practical application of it. The other reply is extramedical or mundane, if we may use the expression, in which old age is above all the loss of the power of enjoying life; secondarily, it is also the march towards death, but very secondarily.

There are between these two opinions well-marked differences, and it may be of use to know both of them. In the first case the physician has all latitude for giving counsels, for explaining the reasons which militate in favor of one or another hygienic measure; he will be asked how one can hope to ameliorate the effects of deterioration, and people will be willing to converse with him on this interesting topic, but always in a vague way, with the least possible idea of immediate application; for those who admit and speak early of their senility are few in number. In the second case, and this is the most common, medicine is intentionally put aside as being an inconvenience and a hindrance. As much as we may be listened to, consulted perhaps, in any case surely stimulated to talk concerning the first conception of old age, by just so much shall we be unwelcome if we oppose this extrascientific opinion. This is because the great majority refuse to admit that old age is anything else than a

period during which one can no more enjoy all the ordinary pleasures of life, and any advice limiting still further these enjoyments is always badly received. It will even be regarded as very bad form to speak of old age to men and especially to women, who, nevertheless, may have passed the age of fifty. This is my advice on this point: I do not approve of the physician who does not wish to tell his patient that he is old, or does not know how to do so properly; to tell him that when one is old one ought not to do as do the young, and that a man must be wise in order to be an old man. I even believe that if he does not know how to be an old man our duty is to teach him. I know very well that some may oppose to this the necessities of retaining one's clientèle, the rules of propriety, and the exigencies of the social relations, and especially that the physician should not irritate his patient. These are opinions which have only a contingent value; the physician must keep himself free from all medical servility and from a too absolutely material preoccupation.

There is no thought of advising too much rigidity in one's relations with his patients, but one should always preserve his dignity in his dealings with his clients, for a lack of dignity is the surest way of losing first the confidence of one's patient, and then the patient himself. We should know then how to tell an old man that he is old; by the employment of a little tact and especially by the exercise of the authority that we should have over those who seek our aid, we shall be able to say everything and to make ourselves understood.

Let us suppose then that the physician has succeeded in speaking with an old man concerning his senility, and that it has been agreed that he shall treat him for this "disease," which he may call by any name he pleases, but which medically should be designated the next to the last stage of existence. He will have to make use of two kinds of measures, namely, those regarding the general mode of life, that is hygiene, and special agents, that is therapeutics. Some explanations regarding this latter point are necessary, for one might be surprised to see therapeutics applied not only against the accidental diseases which may affect the old man, but also in the management of senility itself. The thing would appear strange at first sight, and it even seems to be in contradiction with the conception which removes from normal senility all idea of disease. I need only recall that we must look upon old age as a period of organic diminution, and that even in its normal evolution it may have need of assistance. From a therapeutical point of view we shall see that old age does not find the physician unarmed, and that in many cases we can do much either to retard the movement of senilization or, and this is the more

frequent, to combat the marked and rapidly progressive localizations of the senile process.

I shall not undertake here to enumerate all the hygienic precepts which may find their application in advanced age, but shall keep to the main lines which all flow naturally from the facts which we have acquired concerning the nature of senility, its causes, and its organic and functional modifications.

I have shown that medically and physiologically old age is essentially a diminution in the activity of metabolism. The first duty of the physician will be to get an exact idea of the degree of diminution in the nutritional activities. This investigation will be neither useless nor superfluous, but is, on the contrary, of absolute necessity, for it alone enables us to know positively whether the senility is following a normal course or not, whether it is being installed uniformly throughout the entire economy, and whether we ought therefore to direct especial attention to some particularly menaced point or whether we ought solely to watch over and protect the entire organism. We shall have then to determine the coefficient of senilization for each patient, and this point once determined we shall have to act so as to prevent this coefficient from being too rapidly exhausted. Thus the struggle against senility consists essentially in moderating the various influences which diminish or disturb the activity of metabolism. Thus stated the problem is less complex and, as a result of the recent studies in nutrition, we may easily foresee the consequences upon general nutrition of diet in particular, and of hygiene in general.

Hygienic Measures.

Diet.—One of the most important questions, and one which should never be left to the absolute discretion of the patient, is that of the nourishment of the aged. The physician should exercise great authority on this point. Let us see what is expected of alimentation. We seek by it to procure for the economy the elements which assure reparation of the losses incurred by the exercise of the various functions. In general, the ordinary diet furnishes amply all the materials for repair, and if observers have sought to establish as definitely as possible the quantity and quality of food which is required physiologically, they have done so specially to furnish a table of averages. But even before these scientific works were undertaken man nourished himself sufficiently, and perhaps even better than now; and we may say in a general way that people, in the cities at least, eat too much, if we compare the sum of the income with the organic outgo. It is not necessary to dwell upon this point; our habits and the

necessities of existence have introduced a profound change in the mode of life of man. Very few among us lead a life which is muscularly and cerebrally well balanced; it would be more exact to say that we live too cerebrally, even those among us who take regular muscular exercise. Most people will probably admit that with this new mode of living there ought to have been a change in the manner of alimentation. In order to balance the losses and the receipts alimentation should have been modified so as only to compensate for the waste; the muscular waste being now inconsiderable it calls for less repair, while the cerebrospinal waste, being enormous, its need for repair is urgent. If we consider what usually happens and judge reasonably of the methods of repair which are daily employed, it will be evident that we eat badly because we do not eat solely to repair, and also that we ordinarily eat too much. The body is furnished with elements in greater quantity than can be properly used, since the income is greater than the output; and most commonly we take little pains to procure material in the direction in which an important compensation is needed. We do not content ourselves with repairing or compensating for the wear, but we seek rather to stimulate function in order to increase its apparent needs. We have come to consider solely the brain in man; the other organs are merely companions, sometimes troublesome, of which it would be well if we could rid ourselves, and many even think it the better part not to concern themselves about them at all. It is by acting upon such notions that we have arrived at the present generation, all nerves and brain, and this cerebral hypertrophy, if the expression may be allowed me, has become even more than neuroses or neurasthenia, which are perhaps only its manifestations, the universal disease. But soon, I hope, it will have become so common and general that some one, seeking for distinction and novelty, and desirous of being regarded as strange and original, will hit upon the fact that something remarkable and unique, and consequently desirable, is a large mass of muscles served by a small mass of brains. Perhaps, then, through the force of imitation people will think less and act more, and thus will again be realized the best physiological conditions for the regular evolution of the organism towards death. Alimentation will then be more normally procured, since it will then serve rather to repair, which is its proper function, than to stimulate, under the pretext of repair, which is its apparent function to-day. This digression finds its excuse in the sentiment which has dictated it; it explains my thoughts concerning the alimentation of the aged. Since we eat too much in the active period of life, and since there is danger in this, all the more reason is there for the old man to be careful of

his diet and for the physician to direct it. There are some general rules, according to which we may establish the regular diet of old age. If this period is normal and regular it is ordinarily sufficient to counsel the subject to pay attention intelligently to his needs, to satisfy them and no more.

In the healthy old man the equilibrium has been maintained for long years in excellent condition; there is certainly therefore no need to interfere, and we shall abstain from meddling when we see that those have lived longest and most regularly, who, in consequence of their mode of life and of their station in society, have been less oppressed by the exigencies of our epoch, and who have therefore lived more physiologically, equally removed from cerebral and muscular excesses. But the majority of old people we shall have to guide step by step in their old age, this second childhood, which more than the other has need of leading strings, since in this case the child is larger, stronger, more wilful, and, in spite of appearances, not more experienced, although he is constantly speaking of his experience. We must watch over the diet and must see that it does not exceed the necessities of repair, remembering that in senility there is normally a diminution of nutritional activity. Finally, we must not forget that always or nearly always we shall have to do with an hereditary or acquired condition which has modified the course of the senility in this special subject; this is a point that must never be neglected. We must, then, in the first place see to it that the diet is reparative, but we must never forget that it is useless and even dangerous in the case of old people to try to maintain the strength at a high point by means of alimentation. In a general way, having no longer an active life to lead, the old man has need merely of a diet of maintenance, and it is only in cases in which senility is accompanied by a pathological condition which will probably be the cause of some special modification of this state, that we must occupy ourselves with other than the maintenance alone. But how shall we know whether we have attained or surpassed the useful ration? It is by watching over the performance of the excretory functions; as long as the weight does not vary, and as long as the urea represents the quantity of nitrogen contained in the food, we may regard it as certain that there is a perfect equilibrium and that the alimentation of the old man is sufficient.

The selection of the particular articles of diet is of less importance, and, as a rule, I do not think that a special diet is necessary. We must not forget that the normal old man is not a patient; all the functions of the adult exist also in the old man, only in a diminished degree; the functions are the same, but their activity only is les-

sened. There is, therefore, no reason for ordering a different diet; we must simply regulate the quantity of food and adapt it to the degree of senilization. All varieties of food are admissible, and, whatever may be the usual opinion, special contraindications excepted, the old man should eat of everything. Meat is necessary to him, just as are the other varieties of food, and the proportions only should vary. Special importance should be attached to the external conditions of alimentation. The meals should be regulated just as are those of children; the old man should eat little at a time, but often, if necessary. The abominable habit of one large meal a day is ordinarily injurious to old people, and in any case rich food or a large quantity of food should never be taken in the evening. It is when we study generalized arteritis that we see how much we should distrust the heavy evening meal. Under the influence of digestion the circulation becomes more active, the arterial tension increases, the chances of autointoxication are increased; all of which should serve to put us on our guard against the accidents which may result from heavy eating at night.

We should watch over the drink also. It has been said that wine is the milk of the aged, but I cannot subscribe to this aphorism, which is responsible for many cerebral hemorrhages, attacks of angina pectoris, and of retention of urine; and, although in case of integrity of all the organs, there is no occasion for completely suppressing alcoholic drinks, great caution must nevertheless be exercised in their use. It is sufficient to have present in our mind the physiological action of alcohol, in order to be readily convinced of the pernicious rôle which it plays in the economy at all ages, and how much more it is actually dangerous in old age. Alcohol has certain general and local actions which it is necessary to remember. We know its affinity for water; it will on this account precipitate all albuminous substances from their solution in the gastric juice, and it also determines vasomotor phenomena through its action on the nerve terminations. It is on the strength of this action that alcohol has been placed in the category of stimulants, and it is for this reason also, without doubt, that it has been regarded as a proper food in old age. Ought we to accept this opinion, given the conception which I have proposed of normal senility? To ask the question is to answer it. I regard normal senility as a period of reduced physiological activity, but all the parts of which are preserved in their harmonious relative proportions; and as metabolism should be proportional to the vital necessities, we cannot, without risking a disturbance of this equilibrium, introduce into the economy a food the principal property of which is precisely to provoke a func-

tional hyperactivity in an organic medium adapted to a diminished functioning. Clinical observation and experience demonstrate every day with brutal force the correctness of these theoretical conclusions. Without speaking of cases of drunkenness in old people, which result daily in sudden death, it will suffice to see what happens in an old man who, through some chance, increases occasionally his daily alcoholic ration. If we compare these effects with those observed in analogous cases in young men we shall see how much better this departure from the daily *régime* is borne by the latter; alcohol has a greater effect in the old man, and the disturbance of equilibrium will be more profound in him. We must therefore conclude that every form of stimulation being injurious in senility, one ought to be guarded especially against alcoholic stimulation in this period of life. It will be useful, however, if the habit of taking daily amounts of alcohol has already been acquired, not to break it off suddenly; but it is well to suppress gradually the use of alcoholic stimulants, in order to permit the economy to evolute as nearly normally as possible and in order not to exhaust needlessly the coefficient of vital resistance.

This last sentence is an epitome of the alimentary hygiene of old age, and may serve as a general precept. As a guide in the choice and direction of the diet the physician must not lose from view the fact that the nutritive changes in the old man have a coefficient proportionate to the coefficient of vital resistance, but that the reverse is not true. All the elements necessary for repair should therefore be permitted, but whatever is not directly utilizable should be forbidden. We should energetically forbid all those things which under the guise of stimulants or of antidepressants simply exhaust or temporarily increase out of all proportion the metabolic processes.

Fresh Air.—While, basing my argument on the facts that we have acquired as to the general weakening of the organism in old age, I have insisted upon the dangers of a too generous or too stimulating diet, I must, on the other hand, urge the physician to maintain at its highest degree of activity the respiratory function of his aged patients; for, while it is important not to supply a superabundance of nutrient material, requiring elaboration, it is most necessary to increase as far as possible the oxidizing function. Oxygen is necessary at all periods of life, but especially in normal senility in which the organic changes occurring in the lungs have as a natural result a very serious diminution in the power of respiratory exchange. It may be objected that the weakened organism has doubtless need of a less quantity of oxygen, and that in a well-balanced, normal senility the changes of texture in the lungs have not passed beyond the point per-

mitting a gaseous absorption sufficient for the needs of the economy. This is very true and it is precisely what leads me to affirm that, from a hygienic point of view, we must watch very carefully over the air supply for aged people; and since the lungs are modified and their functional power is decreased, we must endeavor to prevent the ratio of oxygen ever falling below the necessary limit. The old man, like the infant, must have his fresh air. The child is always in need of fresh air because in him all the functions are at their maximum; in advanced age the necessity for pure air is equally great, and for the reason that the functions are reduced to their minimum. I do not say this for the sake of a striking antithesis, but my only aim is to impart an understanding concerning a hygienic error which is very widespread at the present day. The old man in general, especially the well-to-do living in the city, has a horror of fresh air and those about him share his fear; this is often carried to such a point that a person who has reached a certain age often thinks that he should imprison himself and close every avenue by which fresh air might enter his apartment. There are several reasons alleged in excuse of this manner of living. It is understood that I do not here speak of aged people in whom some special condition of the respiratory apparatus constitutes a true disease, either directly, such as emphysema, or indirectly, such as heart disease; these cases belong to pathology. I am speaking solely of normal old people. These have a terror of catching cold, and they generally attribute to a cold all the troubles which are really due to the faulty conditions of their peripheral circulation.

We know what are the conditions of the circulation in the senile skin; the adipose layer has disappeared gradually, modifying and diminishing the cutaneous blood supply. Refrigeration of the surface of the skin is therefore a natural phenomenon, and one which is disagreeable to the last degree to the patient, who seeks to avoid it by all possible means. We must also not forget that under the influence of a general refrigeration of the skin, profound visceral hyperæmias are produced which have a marked predilection for the respiratory apparatus, the latter being so exceedingly vascular. These few general notions will suffice to make us understand how readily this confusion has arisen of taking the effect for the cause. The facility with which the old man acquires an affection of the respiratory tract has led to the immediate conclusion that the lungs themselves were too directly affected by the fresh air, and from this has naturally arisen the custom of confining the old man in a closed apartment, in which the temperature is high; and the question of the quality of the respired air, of so secondary importance does it seem,

is generally forgotten. This is an error against which we must contend. The old man ought to be protected against refrigeration of the surface of the body, but this being provided against by means of suitable clothing, he should fear nothing in the normal conditions of active respiration in the open air. The inconveniences and even the dangers of insufficient oxygenation are to be feared for other reasons also. We ought not to forget that among the exchanges the totality of which really constitute metabolism, oxygenation holds an important place, and that to diminish the quantity of necessary oxygen would be to weaken a coefficient of vital resistance already depressed. We shall have to contend with old-established habits and with apparently well-founded terrors, but the physician should not yield although he will need tact and perseverance to carry his point. Little by little, for we should always avoid precipitancy in changing fixed habits, the old man should accustom himself to being in the open air as much as possible and when in the house of having the windows open a great part of the time.

Temperature.—What I have just said in regard to refrigeration of the surface and its effects in the case of the aged will obviate the necessity of a long chapter on temperature. It is, however, an important factor in the hygiene of old age. The sensibility to cold is much greater in the last period of life than in any of the preceding, and this even in normal senility when there exists no special pathological condition interfering directly or indirectly with the circulation; it may even in such cases assume the proportions of actual suffering, and may also become the starting-point of complications which it is our duty to prevent as far as possible. We must then watch over the temperature of the body and that of the surrounding atmosphere. Whatever may be the prejudices to be overcome, we must always prefer for the old man the physiological methods of preventing colds to any other. We must, as it were, compel the organism to react and to help itself in this direction. We must forbid an accumulation of heavy garments which weigh the individual down and interfere with free movement, especially as the old man has a marked and very natural predilection for inaction, which he exaggerates; he curls himself up in a corner near the fire, inert, without action, and consequently without reaction; he then gives himself up to somnolence in an atmosphere the temperature of which is often unduly elevated, since the nearest place to the fire is yielded to him. The other members of the family do him a poor service in giving him this place. He ought to wear light though warm clothing, and it is very advisable to employ frequently general rubbing of the body and even sponging in water of a suitable temperature, in order to main-

tain an equilibrium in the thermal coefficient, which will always be proportional to the conditions of metabolism.

Muscular Exercise.—Finally, to the same end, and in order to prevent the too rapid losses which result from an exaggerated depression of vital activity, we ought to class muscular exercise among the measures adapted to maintaining the greatest possible resistance in the aged. They should be made to walk and even to work, for movement of all the muscles is indispensable in order to facilitate nutritive exchanges within the tissues and to bring about a more complete oxidation, thus aiding in the combustion of the products of nutrition. We may recall what importance has been attributed to these manifestations of organic action, and what a preponderating rôle the retardation of the nutritive processes plays in the evolution of senility. We ought therefore to insist upon the utility of muscular exercise, and upon the necessity of forcing the old man, despite his opposition, to walk and to exercise. It is very necessary to add that one must have a medical sense which is very sure of itself, in order to appreciate justly how much muscular work may be supported by the patient in each case of senility; one had better, therefore, proceed slowly, making graduated trials, always stopping short of undue effort, for, owing to the depression of the coefficient of resistance, fatigue follows almost immediately upon effort.

Therapeutic Measures.

I need not devote any time to the explanation of these words. They reply to the question whether there are any agents which may modify the various influences which diminish or exaggerate the activity of metabolism. In different cases of senility we shall need either to diminish this activity, in order to prevent a premature senility through a using-up of the tissues, or to increase it in order to retard the organism in its too rapid progress towards the loss of the coefficient of vital resistance. Medical science is not impotent here, and it has agents which retard senilization, just as it is able to indicate the best means for growing old well. The weapons which it furnishes are scattered through the therapeutic arsenal, and we must collect them into one compact group so that we may have readily at hand all aids by which we may combat one or another cause of senilization. These are all agents which maintain, increase, or diminish the activity of the nutritive exchanges.

This is not the place to enter into long details concerning each of these therapeutic agents; I shall content myself with pointing them out. All the vasodilators, such as the iodides and the nitrites, are of great utility. We shall have to appeal sometimes also to the vaso-

constrictors, and here strychnine will often be employed with benefit. Of great service frequently are general and special tonics, like caffeine, kola, and cinchona, in the use of which, however, we must be temperate. In many cases we must derive assistance from other agents endowed with a more special action, such as digitalis or sparteine, which may momentarily relieve a heart on the point of failing. I cannot omit in this rapid enumeration one therapeutic agent which, after having been regarded for the moment almost as a restorer of youth, has to-day settled into its proper place in the therapeutics of senility. I refer to the testicular juice, which the works of Brown-Séquard have brought into evidence. I cannot, nor do I wish to, enter here into a discussion which would lead too far, and I will only say that I have employed injections of testicular juice in certain cases of irregular and sometimes very advanced senility, and that the very favorable results thereby obtained are of such a nature as to make me regard this substance as an agent of real power, the employment of which is rarely contraindicated.

DEATH FROM OLD AGE.

After having studied how we should conceive of senility, after having established the place which it occupies in the evolution of the being, and after having determined its organic and functional characteristics, it is necessary to study the manner of death of the aged. This will be the natural complement of what has gone before, for our work would be incomplete if we did not follow the process of senilization to its last stage.

Necessity and Utility of Death.

I have endeavored hitherto to indicate constantly the application which the physician will often be led to make, to the great advantage of his patients, of certain notions which at first might appear to be rather far removed from any possibility of immediate or frequent utilization. And I think that this study of old age should not be terminated without a word as to how we physicians ought to regard death and understand its rôle. There is a certain cowardice in not entering boldly upon an analysis of this transformation of life, and it is to be regretted that medical men especially have taken so little pains to understand death as it really is. I do not think that it will be too great a departure from my purely medical and practical point of view to devote a little attention to the study of this theme, for in truth there is no more medical or more practical question. There is no reason why we should be afraid of the idea of death, and we ought

to familiarize ourselves with it as with all the other phases of life. The rôle of the physician is to fight against it and we might even say also to fight for it. I mean by that that our efforts ought to be directed to preserve the individual from accidental death, which is a deviation from the natural law, and to lead him gently to death from old age, which is the natural goal of existence. The true physician ought to be able to remove prejudices and to lead man to regard death from a high plane; he should see in it solely a necessary biological phenomenon, which is useful and consequently good, as it really is. However strange and exaggerated these words may appear at first sight, we need only reflect for a moment, representing to ourselves the true rôle of death, in order to appreciate the exactness of this mode of regarding it and to understand how it is possible to look upon it as necessary, useful, and even good.

Death is *necessary*. I have defined the living being as a sum of forces individualized under one form and possessed of properties the most characteristic of which are instability and the power of attraction. But the living being, subjected to changes in his surroundings and forced to react against its variations, is differentiated in certain parts, which are adapted to this medium. This adaptation necessitates certain specializations, the result of which is necesarily to determine a diminution in the characteristics of the living being. The diminution in the power of attraction results in a weakening of the power of repair and in consequence of this the organism wears itself out in its functioning. When the vital activities are exhausted we say that the living being is dead. The necessity of this final transformation of the living being explains itself. Death is therefore necessary.

Death is also *useful*. We can easily imagine what the earth would be if death did not exist. There would be a frightful struggle to obtain the necessities of existence. If death were not the end of the living being the smallest particle of food would be contended for by a legion, and the time of all creatures would be solely employed in fighting. There would be a constant increase in violence and an uninterrupted ascendancy of brute force. Death is therefore useful since it assures a supply of food proportionate to the needs of the living, and this happy result permits of progress through the balancing of appetites and necessities; it also gives to those who live the time to occupy themselves with recreation in the moments of respite that the search for the satisfaction of their needs leaves to them.

Finally death is *good*. It puts a term to the struggle for life; it prevents us from taking account of our deterioration, of that fatal deterioration which comes from the very employment that we make

of our functions. It is necessary to say that this last conception is far from being that of the majority of mankind, but the divergencies in the mode of understanding death are due solely to the different points of view from which it is regarded. It is wrong to generalize on this question; we are too prone to refuse to analyze it, and the cessation of life is looked at a little too superficially; we scarcely distinguish the innumerable varieties of accidents which may lead to death. Above all modes of dying is that which we must call natural death, physiological death, that which necessarily and happily terminates existence. This death is gentle and calm, for it is free from all painful manifestations; it is therefore desirable and all our efforts ought to be directed to its attainment. We should try to have it accepted as a happy event. Far be it from my intention to walk along the paths beaten by pessimists of all ages, and especially of our own. I condemn their views. I do not say that life is a detestable thing and that our only refuge against it is death. I have not to occupy myself with the value of life. Most commonly, I believe, it is worth only what we make it worth. But, after having seen that all the vital phenomena have fulfilled their evolution, we may justly believe that this final act, that which is accomplished naturally, without our having had any responsibility in its hastening or retardation, that which terminates the series of organic acts, ought to be regarded as welcome.

Natural Death.

It is, I repeat, of natural death that I am speaking, of that which occurs not through accident, but gradually, as the natural and final evolution of the being; that, in a word, which is the necessary consequence of extreme senescence, that which is only the loss of instability, through the disappearance of the power of attraction and the exhaustion of the coefficient of vital resistance. It is this death of the aged that I wish to study first, and we shall see that in it there is nothing to cause fright, but rather the contrary. But, before being able to grasp this conception, and to derive satisfaction from it, we must divest ourselves of the impressions formed from social habits, affections, and passions. The mind must make an effort to rid itself of the ideas which it has received and to regard solely the biological phenomena in their logical tendencies; we must forget the affections, ambitions, and aspirations of our social existence, for it is the loss of all these contingent things which we regret the most, and which makes death feared because of the cruel separations which it imposes. He who can for a moment raise himself

above the common level and reach one of quietude will be able to regard death as a simple phenomenon, and when this phenomenon occurs at its proper time and normally, he may regard it with tranquillity and with that satisfaction which is attached to events which are regularly accomplished without shock or perturbation. We need only see an animal die of a good and healthy old age in order to obtain a conception of this form of death. I have seen many old people die, but, in truth, very small was the number among them in which the physician could find no pathological cause for death. Most frequently one dies, even in old age, of some disease, and more strictly speaking one dies of the old age of his kidneys, of his heart, of his lungs, or of some other organ. But although this is so in the immense majority of cases, it is yet not so extremely rare, in homes for the aged, to see certain individuals extinguished as the result of senility alone, and in them the spectacle of death is truly consoling.

We may easily picture to ourselves the mechanism of natural death through normal senility. In this period of life the power of attraction is considerably diminished; on the other hand the nutritive changes tend daily to a diminution; consequently a reduced repair corresponds to a diminished sum of functional activity, and this double influence goes on daily increasing the reduction of the coefficient of vital resistance. The condition of each organ is thus modified, its functioning is attenuated, but, as the functional relations are preserved, a proper equilibrium between the various organs of the economy is maintained without effort; were this not so a rupture of the mutual relations would occur which we regard properly as disease. Senility is thus installed, becomes accentuated, and completes its work, not of disorganization, as most observers have said who would regard senility as the slayer of the living being in detail and organ by organ, but of immobilization.

This is the real picture of an old man dying from senility. The greatly diminished functions permit of very limited movements; the digestive organs have almost no work to perform, and the appetites seem to have disappeared; hæmatosis, which has become almost useless, has no longer need of a more rapid or prolonged contact of the blood with oxygen; the respiratory movements are therefore reduced in number and in intensity; their retarded rhythm conveys no idea of respiratory distress or of struggle for air; the examination of the heart shows regular pulsations, diminished as regards their intensity, and also, though less evidently, as regards their number; we feel actually that the heart has itself also nearly exhausted its coefficient of contractile power and that it still contracts, no longer in order to fulfil a rôle which is henceforth useless and without effect, but be-

cause simply there are still remaining in it some traces of its functional power. And all this takes place without effort, without noise, without resistance, because there is neither struggle nor reaction. There is no more pain, and we can easily understand the absence of this sign of increased nervous functioning. Brain, cord, and ganglia, all the nervous centres, have participated in the general depression and they are no longer capable of transmitting stimuli, they no longer appreciate the diminished irritations, and their action is extinguished as regards both receptive power and exciting power. But the general harmony has not been broken, the equilibrium is preserved between the various functions, and thus the rôle of harmonizing bond which the nervous system plays is preserved in its entirety; all the parts of the machine work in harmonious union, although its action is diminished to such a point as perhaps to make us believe that it has definitely ceased. And this is so true in the picture of natural death in the aged that we cannot always tell the precise moment of physiological death, and if I might make use of a comparison in order to convey a better understanding of the subject, I might recall the tuning fork, which vibrates even after it can no longer be heard.

Such is the mechanism of the natural death of senility. We see that it is above all a picture of calm, of serenity, which is explained very naturally by the complete accomplishment of function; it is this death whose rôle, necessity, and grandeur I would fain have understood. By this conception of the final phases of life the horizon of medical philosophy is widened; we are led thereby to regard senility as a period of life which must not be neglected; and finally we find in it the proof of the utility of medical intervention in order to conduct old age properly and defend it against an abnormal evolution.

Death from Disease.

But how rare is this natural death. We must therefore seek to learn how the aged die, since they rarely die of senility alone. There are certain causes which hasten or provoke senility. These causes act by diminishing the coefficient of vital resistance; and the immediate result of this is to furnish a soil well prepared for senility.

Whatever may be the pathogenic explanation of each case of old age it would appear that, the question of age being put to one side, the picture should always present itself under the same aspect, and that death by senility, whether this exists as the result of an extreme length of life or whether the exhaustion of the coefficient of vital resistance occurred earlier because of a diathetically predisposed soil,

ought always to be produced in the same way. Now, clinical experience shows the incorrectness of such an opinion and teaches us that each old person dies in a different way. Evidently the characteristics of senility will not be wanting; but to them are superadded the signs of a more marked senility in one or another organ to such an extent that it constitutes a true pathological condition of this organ. It is then really a disease which complicates each case of senility, and we may in such instances affirm that the old man dies by his lungs or his heart, his kidney, his liver, or his brain, rather than from senility. The clinical pictures are various and I shall here review them rapidly.

But first we must inquire why in each individual case one or another organ undergoes changes in texture more rapidly and more completely than do the others. In order to explain each morbid determination of old age we must recall to our memory the extrinsic causes of senility, and the modes of action of these causes. All act by exciting changes in metabolism, the direct consequence of which is a diminution of the coefficient of vital resistance. This coefficient of vital resistance is formed by a sum of components each representing the vital energy of one of the organs of the economy. Whenever a general perturbation occurs in the organism each of its parts suffers from the recoil, and its function is affected. Whether we have to do with a diathesis, with a slow intoxication, or an acute infection, we must admit its action upon each organ and each function. But it may be asked why any particular organ should be more profoundly affected or less rapidly repaired than the others. The answer to this question was formulated long ago in the law of *locus minoris resistentiæ*. It is, however, not scientific to content one's self with a simple affirmation which cannot be supported by proofs, and this reply in particular does not seem to me to explain much. It is far better to confess that this point is not perfectly elucidated. There are some causes which are known and there are others which are not known, or which can only be suspected. And first among the causes of senility there are diseases which affect primarily some special organ, and only secondarily induce general disorders. There is no doubt that in such cases if, in spite of this organic alteration, the individual lives to old age, the primary disease of the organ, the exciting cause in fine of this variety of senility, will become in a measure exaggerated, and will necessarily occupy the first place among the symptoms of this special senile evolution. Take, for example, an alcoholic habitué, in whom the first sign of poisoning is inflammation of the mucous membrane of the stomach. The alcoholic gastritis of this patient will necessarily cause certain general troubles, which independently of the alcohol will produce secondary intoxications. Let

us suppose that this patient lives to old age; we shall see that dyspeptic phenomena will hold the first place in the picture of his senility. This will be really an old age combined with dyspepsia, and surely this patient will die rather from the dyspeptic old age than from the old age of his years. We see here a first cause of localization in senility, and consequently of variation in the mode of death in old age.

In a second series of cases we must place the predispositions of certain organs, either by their texture or their function, to suffer more than others from the pernicious effects of toxic or chemical agents. We know the readiness with which the liver undergoes fatty degeneration or sclerosis according to the noxious agent, as examples of which we need only mention the effects of lead and of alcohol. If, now, one of these lesions exists in a man who has, nevertheless, survived to an advanced age, the death of this old man will present, by reason of his organic malady (steatosis or sclerosis of the liver), a clinical picture in which the hepatic symptoms will occupy a large place, modifying to an equal degree the picture of death by simple old age.

In a third category we place the diathetic senilities in which the diathesis has limited organic determinations, such, for example, as we see in the case of the emphysematous old man, whose death is that of old age but to which the respiratory function will give a special clinical aspect.

There are unquestionably also other varieties upon which I shall not dwell, for to explain them we should have to invoke the aid of pure hypothesis. It is for cases of this kind that I would accept the explanation of *locus minoris resistentiæ*, with the reservation that I have already made concerning this theory.

Special Modes of Death.

Old people may therefore die from other causes than old age, and death may be due to the heart, to the kidneys, to the lung, or to any other organ. We know also that during old age the senilization of one organ may preponderate markedly over that of the others. The explanation of such cases has already been given, but we have yet to study the clinical aspect of the principal modes of dying in the aged. I shall limit myself to a consideration of the principal forms only, viz., the cardiovascular, pulmonary, urinary, dyspeptic, and cerebral.

Cardiovascular Type.—In the study of the senile heart we must emphasize the preponderating rôle of the myocardium. Clinical observation shows us the necessity of reacting against the present too

marked tendency to interpret by arteritis a large number of symptoms which, in the so-called arterial cardiopathies, belong properly to the muscular element of the heart. We cannot here discuss this very large question, which deserves a profound study and one based upon actual facts. Many of the best authorities have also begun to accord to the myocardium once more its true importance. Whatever may be the theory, at the bedside it is to the clinical symptoms that we must always return. Death by the heart presents three chief forms in the aged: the old person may die either from his heart alone, from his arterial system and heart combined, or from his aorta.

In the first of these cases the clinical picture corresponds exactly to that of chronic asystole. It is, indeed, a true chronic asystole which kills the old man dying by his heart. When we follow an aged person whose heart has been affected for a certain time, we note that among the stigmata of senility some stand out prominently, dominating the scene, and that they are precisely those referable to bad action of the myocardium. There is an insufficient contraction of the heart, with irregularity, stumbling, and intermissions.

At first this disturbance in the function of the heart will seem to be without great importance in consideration of the age of the patient. In the healthy old man, indeed, the pulse is a little more frequent than during adult life; it often presents the characters known under the name of pulsus paradoxus, and not uncommonly we detect in it, in addition to the irregularity, certain intermissions or stumblings. We might be tempted to see in the first case a simple evidence of what is the normal condition of the heart in advanced age, and we might thus be lulled into a false security. We must learn to know how the non-pathological senile heart contracts; we shall soon discover that the contractions may present quite varied types of irregularity, but at the same time, if the observation is not too superficial, we shall remark that in all aged people in whom the cardiac function is good, these irregularities always present themselves with a regular rhythm. Let me explain myself by an example. Let us take an old man eighty-seven years old, thin and vigorous, alert and cheerful. His pulse is 75; some arrhythmia and intermissions are noted in it, but these are very regular in their occurrence; thus we may count twelve normal pulsations, followed by from three to five rapid ones, then an intermission occurs, and so on. The action of the heart is satisfactory; after twelve good contractions it becomes slightly fatigued and is a little spasmodic in its action; tired by its work it misses a beat, this slight pause suffices to rest it, and then it goes on. In the interpretation of this type we might very well, regarding simply the muscular contraction, compare this mode of car-

diac pulsation with what takes place in intermittent limping in horses. The muscular fibre after a certain number of normal contractions becomes tired; it feels the need of a rest and this it takes by means of a pause which reaches our ear as a true intermission. I need not dwell longer on this point. I wish here merely to bring out the significance of regular irregularities of the heart, which are so frequent in aged people.

But whenever we find a really irregular heart in the aged we must be on our guard, for asystole is threatening the patient and will gradually get him in its clutches; the shortness of breath becomes more marked, and it no longer has the distinct character of that form which has been so well called the dyspnœa of effort. As soon as the patient begins to move his respiratory movements are quickened, and if he stoops and sits down the shortness of breath continues. Even during complete repose the hard breathing is noticeable; the respiration is not only more rapid, but the loss of breath has not that superficial character which is so peculiar in the subjects of arteritis; the thoracic movements are extensive, and all the respiratory forces are brought into play. This method of breathing is of importance clinically. Œdema supervenes, at first slight but gradually becoming more marked. At the same time the symptoms of chronic asystole appear, become generalized, and imprint upon the picture a most distinct cardiopathic seal, death occurring exactly as in cases of failure of the myocardium. The only marked difference is found in the duration of the period of evolution, which has been much shorter than in the asystole of young heart subjects. It comes on sluggishly in the aged, but under the influence of the more unfavorable accessory causes, such as attacks of coughing from a slight cold, or vomiting, it progresses rapidly. Death occurs with the picture of an intense asystole.

In a second form the patient dies by his heart and his arteries. The asystole is slower, its progress being apparently retarded by the heart becoming accustomed to the arterial lesions and by a sort of accommodation which has been established for a number of years. Some day asystole appears, but the principal character of this variety is a much less rapid evolution; it is rather cardiac cachexia than true asystole, and the exterior appearance of the patient, as well as his strength, suggests generalized arteritis much more than myocardiac insufficiency. It is not a myocardium revolting against obstacles and wearing itself out by trying to conquer them; it is an old muscle, soft and lax, which refuses to struggle and contracts with indifference.

In a third category I place those old people who die by the aorta. These patients are most frequently carried away by a true angina pectoris, the mechanism of which is so well understood that I

need not dwell upon it here. I prefer to give a little more attention to a variety which is peculiar to the aged. It is a clinical form which has been described under the name of chronic angina pectoris, but I prefer that of aortism. It characterizes in great part the clinical condition known by the name of Hodgson's disease in its final stage. The following is a brief description of the principal features of this pathological condition as I have observed them in the Hôpital Sainte-Marguerite: Although we find here all the symptoms of chronic angina pectoris there are no terrifying attacks, but the patient, half-reclining on his pillows, usually on his back, remains motionless in order to escape as far as he may the feeling in his chest as of compression in a vice, with sensations radiating into the neck and arms; but all without the intensity and suddenness seen in true angina. Neither is there any period of calm, for the condition remains permanent. The respiration, furthermore, assumes a very superficial type, and this the patient retains up to his death. The latter comes on slowly, as much because the patient, breathing badly, fails to receive a proper amount of oxygen as through the progressive diminution in alimentation, since he eats less and less each day in his effort to avoid all movement. This clinical form bears the same relation to true angina pectoris that acute asystole does to chronic. The patient rarely dies in an acute exacerbation, and at the autopsy we see that the condition of the myocardium can never have been of prime importance in the causation of these symptoms.

Pulmonary Type.—This mode of death is frequent in old age. We may say further that pulmonary changes are almost the rule in advanced age. It seems almost useless, so common is it, to draw again the picture of the emphysematous old man dying of his emphysema, which is almost always accompanied by bronchial dilatation with catarrh. Everybody knows this coughing and catarrhal old man, fearful of the least air current because it increases his bronchitis. He lives in a corner by the fire, loaded down with garments which he puts aside regretfully even in the hottest weather; bent over, with the shoulders drawn together, fearing to make any effort even to speak, the spittoon always by his side, when he hasn't it between his legs or on his knees, he suggests a phthisical patient in the last stages of his malady. The organs concerned in hæmatosis undergo marked transformations in old age. The pulmonary lobule is modified anatomically; its alveolar septa are atrophied, while the air sacs themselves are dilated. The following is the anatomical description given by Cornil and Ranvier: "The nuclei of the alveolar epithelium lying between the capillaries hypertrophy, become granular, and soon in place of a living element we find a little mass of organic matter,

dead from fatty transformation. This matter, deprived of all vitality, is quickly destroyed, and leaves in its place a perforation of the wall, giving rise to a communication between two neighboring alveoli, which were up to that time independent of each other. Several such perforations soon appear simultaneously in a single septum. Then the elastic fibres by their constant tendency to retract cause tears, the capillary vessels deprived of their support atrophy, and the blood supply in this part is greatly diminished or abolished. An infundibulum thus formed by the simultaneous lesion of several of the alveoli which open into it soon presents upon its internal surface, instead of the septa which formerly separated the alveoli, simple elevations formed of elastic fibres, the last vestige of the partition walls." The sclerosis resulting from arteritis, chronic pneumonia, anthracosis, emphysema, or pneumogenic pleurisy invades the parenchyma and offers an obstacle to the easy play of the lungs. We must recall also the thoracic deformities caused by osteoporosis of the ribs, ossification of the cartilages, or immobilization of the chest wall due to the diminished power of the muscles. And finally we ought not to forget the part taken by the pulmonary vessels and the importance of the lesser circulation in the functional life of the lungs. All these are various causes which may alter the pulmonary functiod in the aged, either acutely or chronically. Death by the lungs in advanced life is therefore very common. During nine months of the year, from September to May, acute pulmonary affections cause the greatest number of deaths in homes for the aged.

In the order of frequency we must place first simple pulmonary congestion, a condition to which is not usually given the prominence it deserves, for in many autopsies I have found that the disease had not passed beyond this stage. It might be assumed, perhaps, that a slight degree of congestion was sufficient to disturb the equilibrium, which is always precarious in the economy of the aged, and that this congestion was only the first stage of an affection which had not had time to develop, death having removed the patient before its evolution was complete. This opinion has much in its favor, but as these cases are far from being rare, and as the duration of the last illness in those here referred to was long enough to permit of the evolution of the congestion into a more definitely characterized form, such as bronchopneumonia for example, the theory loses much of its force, and we must conclude that acute pulmonary congestion alone may constitute a fatal disease in the aged. But it is acute bronchopneumonia, of rapid or slow course, which carries off the greatest number of old people; then follows lobar pneumonia, most commonly of the apex. We must also mention acute and sometimes foudroyant pul-

monary œdema of aortic, arterial, or toxic origin. We shall see below the picture of the death of an old man from some acute pulmonary malady.

Passive congestion of the lung, hypostatic pneumonia, is of very frequent occurrence in the aged, for passive congestion readily takes place in a weakened organ like the senile lung. The least external cause, such as a blow on the chest, a fall, a slight rise of temperature, fatigue, indigestion, or constipation, may lead to hypostasis, and usually this is the point of departure for the respiratory marasmus of which I spoke in the beginning of this section.

Digestive Type.—I should need more space than is at my disposal to treat thoroughly of senile dyspepsia and to give a picture of death from inanition in the aged. Death from dyspepsia in old people is possible, for the digestive organs, like all the others, undergo changes under the influence of general senility, which cause disturbances in their functioning power.

The gums recede, the teeth become loose, and after their fall the alveoli become atrophied; the maxillary arch is reduced in size, the gums become white or grayish in color, and the stratified layer of epithelium covering them becomes hard and as if cornified in consequence of the repeated pressure made in the act of mastication. The horizontal ramus of the inferior maxilla diminishes in height, and the angle between the ascending ramus and the body becomes obtuse.

The changes occurring in the *gastrointestinal tube* are important. The mucous membrane becomes whiter in appearance and so thinned as to be reduced to a mere pellicle assuming the appearance of a serous membrane; this is especially the case with the mucous membrane of the small intestine. It becomes smoother through the atrophy of the glands and the disappearance of the villi; its rich blood supply is notably diminished in consequence of the fatty degeneration of a part of the capillary network. Finally we find atheroma of the vessels of the stomach and intestine. The muscular fibres are weaker and consequently contract with less vigor, and as a result of this we find dilatations of the stomach and intestine, especially of the large intestine. In some cases, however, a narrowing of the stomach through hypertrophy of its walls has been noted. The muscular atony is especially marked in the large intestine and rectum; hemorrhoids are common in the aged. The intestine often contains dried and hardened fecal accumulations.

The *liver* undergoes alterations which it is of interest to recall. It is decreased in volume and weight, and its shape is often modified. But it is especially from a histological point of view that this organ is interesting. The following description of these changes is con-

densed from an article which I published some time ago in the *Revue Hebdomadaire*. We may observe two very different appearances of the hepatic lobule according as there is or is not fatty degeneration.

When there is no fatty degeneration the general appearance of the liver is well preserved except as regards the superficial lobules in contact with Glisson's capsule. We must examine sections made through the parts where the capsule is thickened. In these cases we see fibrous bundles starting from the internal surface of the capsule and passing into the substance of the lobule, separating the normal elements and strangling the hepatic cells, the remains of which are found in the midst of the anastomosing bundles of connective tissue. These bundles of varying size are disposed in a way that should be specially noted, since it is in a measure characteristic of the senile liver. From the portion of the capsule corresponding to each perilobular space an enormous triangular pyramid of connective tissue projects, the base of which rests upon the capsule and the apex terminates in the corresponding portal space, which is itself greatly sclerosed. This enormous bundle pushes itself in like a wedge between the lobules and often extends a considerable distance, while the other offshoots which penetrate the lobules are of considerably smaller size. Thus a section, one of the sides of which is formed by the capsule, presents the following rather regular disposition: We find a fibrous band indented on the side of the lobules and at certain distances other large fibrous bands becoming lost in a portal space; between these very thick bands there is a series of other much smaller ones penetrating the lobule for a short distance. In sections made in the centre of the liver we note that the portal spaces are considerably sclerosed; that the perilobular spaces are sometimes a little more marked than in the normal condition; that the vessels show changes, there being endoperiarteritis (this lesion was noted in eleven cases studied by me) and the suprahepatic veins being slightly thickened. The connective-tissue lesions do not extend round the vessels, but remain localized, forming especially round the little arterioles fibrous plaques of slight extent, but with very distinct borders. This disposition of the perivascular fibrous tissue is important, for it differentiates absolutely sclerosis of the senile liver from other cirrhotic processes of the organ; and on the other hand, if we find alterations in the hepatic cells these must be due to some other cause than the encroachment of the connective tissue within the lobules and strangulation of the hepatic cell. These lesions of the parenchyma are at first but little pronounced. The most prominent of them is the diminution in volume of the hepatic cell; this is constant, though it varies in degree. The atrophied cells rest upon a stroma composed

of fine fibrillæ, which take a pale pink stain from picrocarmine, with here and there nuclei of a deeper red color. This appearance is to be interpreted as an hypertrophy of all the connective-tissue support of the parenchyma, constituting hepatic xerosis. It is to be remarked that the diminution in volume of the cell always appears to coincide with a thickening of the stroma.

I should have contented myself with merely mentioning fatty degeneration, as it is such a common lesion, were it not that in the senile liver steatosis affects a peculiar form, which has not been described. The fatty lobules are very regularly distributed, forming in general fatty zones, surrounded by other zones in which there is no steatosis. The following is the arrangement of the fat cells in these lobules: Around the central vein, ordinarily a little thickened, there is a layer of hepatic cells free from fatty degeneration. This central nucleus is surrounded by a zone of the parenchyma, in which the cells are filled with little droplets which refract light. This band, which is of variable thickness in the different lobules, is of practically the same thickness in each lobule, forming a fatty ring around the central nucleus. Finally, surrounding this degenerated portion of the lobule, there is a zone of hepatic cells not fatty degenerated, and this zone constitutes the periphery of the lobule. This disposition is absolutely different from the ordinary distribution of fat in the hepatic tissue. It is neither an accumulation in the centre of the lobule, as in certain physiological conditions, nor a peripheral localization, as in ordinary fatty degeneration of the liver. The supra-hepatic veins are slightly thickened.

The most intense sclerous lesions are found in the portal space. We cannot better describe the appearance of the portal space in the senile liver than by saying that it represents an exaggeration of this part of the healthy viscus. In sections of the normal liver the portal spaces are seen to consist of an irregular triangle of fibrous tissue in the centre of which we find the portal vein, the hepatic artery, and the bile channels. The connective tissue which forms this triangular fibrous plaque is old connective tissue, the boundaries of the fibrous triangle are very distinct, and there are never any offshoots from it penetrating the lobules. The apices of the triangle which pass between the lobules terminate ordinarily by a fine extremity which disappears in the intralobular fibrous tissue. We note also a slight rarefaction of the hepatic cells around the portal space and a proportional thickening of the connective-tissue fibres in contact with the latter. The elements surrounded by the sclerous tissue are in the portal space profoundly affected; the portal vein is more or less, but constantly, patent and often contains blood. The walls of the vein

are incorporated in the fibrous tissue, and it would appear as though the latter was simply formed by a thickening of the external coat of the vessel. But the most marked change is seen in the artery where we most frequently find a pronounced endoperiarteritis; in varying degrees this is almost always seen. The bile ducts of the portal space are open, thickened, and surrounded by fibrous tissue. We sometimes find in the larger sclerosed portal spaces channels of new formation.

The hepatic cells are atrophied and this constitutes one of the essential characters of the senile liver. The degree of atrophy varies, but whatever it may be the cells are smaller, granular, contain bile pigment, and frequently present lesions of fatty degeneration. The gall-bladder is often thickened, adherent to the liver and neighboring parts, and sometimes calcified. It very often contains gall-stones. The bile is less abundant and thicker than normal, and contains more cholesterin, a favorable condition for the formation of calculi.

The *pancreas* is very commonly atrophied and may be fatty degenerated in senile marasmus. This compares strikingly with the almost absolute integrity of the salivary glands.

The *spleen* is diminished in weight and volume. Its tissue becomes more firm and less friable; the capsule is thickened and often studded with white fibrous or calcareous patches, sometimes of considerable thickness. On section the parenchyma is seen to be harder than in adult life and there is a very evident increase in the connective-tissue framework. Most of the glomeruli are atrophied or have completely disappeared; many of the vessels are obliterated; and the splenic pulp is greatly reduced in amount, so that the organ is almost entirely converted into a mass of connective tissue permeated with vessels. Very often we note atheroma of the splenic artery, coinciding with atrophy of this organ. A further study of the histological lesions of this organ in senility is, however, a desideratum.

The *lymphatic ganglia*, especially the mesenteric glands, are atrophied. There has also been observed in the aged a hyaline degeneration of the lymphatic glands coinciding with a calcareous change in the arteries of these glands. Lancereaux has noted in very many cases in the aged a sclerous and pigmentary atrophy of the subcutaneous or visceral lymphatic glands.

We see from this study that there is little cause for surprise that the digestive functions are affected in the aged. The incomplete mastication leads to an insufficient insalivation; the gastric juice is secreted in less quantity, since many of the glands are atrophied; the pancreatic juice, the bile, and the intestinal juice are insufficient in

amount, and the chemical phenomena of digestion have not consequently the necessary activity. Further than this the gastrointestinal atony causes a retardation of the mechanical processes of digestion; the thickened bile, reduced in amount, no longer acts so as to sweep out the waste products of digestion, and consequently there is stagnation of fecal matters in the large intestine and rectum, the walls of which are enfeebled. From all this result the digestive troubles of chemical or mechanical origin which are so frequent in the aged; and in this way are to be explained the cases of obstinate dyspepsia, either gastric or intestinal, the slowness of digestion, the habitual constipation, the accumulation of fecal matters, stercoral typhlitis, and the frequent occurrence of gall-stones. While digestion is affected, absorption also takes place with difficulty in consequence of the atrophy of the intestinal villi and of the lesions of the lymphatic glands and the liver. Assimilation is thus interfered with and we can readily understand that nutrition is reduced to a minimum, and that the aged patient falls into a state of absolute marasmus after a complexus of symptoms which I can describe by no better name than senile athrepsia. Landouzy has already said that senility is a bradytrophia.

Urinary Type. Vesical or Surgical Form.—I shall be very brief in discussing this subject, which is such a familiar one, since the old *urinaire* is very frequently seen in medical and surgical clinics. I have said purposely old urinaire and not aged urinaire, for we must distinguish between the two. The old urinaire is one who for a long time has suffered from a trouble of the urinary passages, but he is not necessarily an old man, while the aged urinaire is such. This distinction is not useless, for it is a fact borne out by observation that few old men are actual urinaires. The reason for this is, I believe, that the diseases of the urinary passages are of such gravity that they seldom permit long life to those suffering from them. As soon as senility has become the cause of a urinary trouble, either the latter is mild and readily curable or it is serious and the patient does not last long. It seems as though urinary intoxication cannot be borne in old age, and the aged person who dies of urinary disorders dies as from an acute disease. As a rule diseases of the prostate or of the bladder belong only to the first period of senility, and they are rarely encountered in the very aged.

Renal or Medical Form.—This is very frequent, for the kidney is always xerous and often sclerosed; it is the senile kidney described by Charcot, Ballet, Bouchard, and Demange. Macroscopically the senile kidney resembles the small contracted kidney of interstitial nephritis; it is small, granular, and yellow, or sometimes red. In

the latter case it is congested and we note at the same time a cardiac or pulmonary affection which suffices to explain the venous stasis; in this case we may assume that we have to do not with a purely senile kidney, but with a mixed lesion resulting from a combination of the cardiac and senile kidney. The uncomplicated senile kidney is pale in color and bloodless. The following is the description which Demange gives of it: "On the surface the kidney is granular, dotted with little grayish or yellowish spots the size of wheaten grits; there always exists a certain number of cysts projecting from the surface of the kidney, varying in size from the head of a pin to a large pea, some having been noted the size of a walnut or even larger; there may be as many as fifteen or twenty, or even more; their walls are thin and transparent and are easily ruptured by the pressure of a finger, giving exit to a liquid resembling urine in color and odor. The external appearance of the kidney is completely modified. While preserving its general shape it has lost its smooth surface, the latter being irregular, depressed in some places and prominent in others; in a word the kidney has a lobulated aspect. The prominences, which vary in form and number, are separated by more or less deep fissures, the bottom of which is constituted by a depression of the renal parenchyma and capsule, and has the appearance of a whitish streak of connective tissue resembling cicatricial tissue. The capsule is detached with difficulty, especially over the fissures; it is thickened and is sometimes so adherent that when torn off it brings with it pieces of the cortical substance firmly attached to its internal surface. The consistence of the kidney is increased, its tissue is hard and is not easily marked with the finger nail. In a longitudinal section we note atrophy of the cortical substance and often a decrease in volume of the medullary substance. The cortical substance is diminished in thickness, most frequently in its entire extent but sometimes irregularly; it may be reduced to a grayish-yellow band only two or three millimetres (one-twelfth to one-eighth of an inch) in thickness; it is wholly unrecognizable; the atrophy is most marked at the level of the fissures. The pyramidal substance is ordinarily darker in color and clearly differentiated in this way from the cortical substance. The pyramids are less distinct, sometimes decreased in size, but their atrophy is never equal to that of the cortical substance."

The renal arteries are most frequently atheromatous, but in varying degree; sometimes we find merely yellow spots in their walls, sometimes they are transformed into rigid tubes. They become tortuous and sometimes moniliform within the parenchyma. Ballet regards as "almost constant" the presence of atheromatous foci narrowing the renal arteries at their origin from the abdominal aorta.

Under the microscope we find a varying degree of atrophy with xerosis and sclerosis of the glomeruli; this varies from simple periglomerulitis to total glomerulitis with destruction of the vascular loops of the glomerulus by the sclerosis. We see the same alterations in a great number of the convoluted tubules, which are contracted at certain points and dilated at others; they are sometimes recognizable in the midst of the sclerosis only as collections of flat or cuboid epithelium. In a less advanced stage the lining epithelium is granular but rarely fatty. Henle's loops undergo similar changes in the ascending branch; the descending branch is often filled with hyaline cylinders. The vessels are affected with endoperiarteritis.

The connective tissue forms more or less thick bundles extending for variable distances and strangling the elements which may be encountered in their passage. The capsule is more or less thickened; from its under surface sclerous bundles pass to lose themselves in the cortical substance, and it is the retraction of these bundles that gives to the kidney its granular aspect.

Urinary insufficiency is imminent in the old man. It is worthy of remark, however, that this urinary insufficiency is always more apparent than real. The urine of the aged is poor in the products of excretion, it is true, but this is because nutrition and organic combustion are less active, the diminution of the nutritional activities being the normal condition in the old. Thus urinary insufficiency reveals itself only when there occurs a perturbation in this normal state, and it is for this reason alone that old people are ever carried away by uræmia or urinary intoxication. Apart from these cases we find most frequently merely old people with nephritis. This type is too well known to call for any extended description here.

Nervous Type.—We might study many varieties of this mode of death among the aged, but they may be reduced to three principal types, viz., cerebral hemorrhage, softening of the brain, and senile dementia. We need not dwell upon these conditions here, for cerebral hemorrhage and softening are affections which are too well known to require a detailed description, they having also been sufficiently studied in another volume of this work, and senile dementia is clinically the same as dementia occurring at any period of life.

ORDINARY DISEASES IN THE SENILE.

I have endeavored in the preceding sections to show that senility is under the general dependence of causes which determine a retardation of metabolism, and I believe that I have proved that senility, such as I conceive it to be, is not a simple hypothesis. We can there-

fore, as practical physicians, accept this mode of regarding it, and can use it as a firm basis for our further studies of old age. In this section I desire to treat of senility in its relations with the ordinary diseases and to prove that the dominating factor in the symptomatology of these affections at this time of life is still the condition of the nutritive changes. Here again the notions of the power of attraction and of the coefficient of vital resistance will be necessary to explain both the mode of action of diseases in old age and also their various modes of reaction.

In his "Clinical Lectures on the Diseases of Old Age," Charcot insists, with all physicians who have practised much among the aged, upon the defective reaction observed in advanced life, and following Beau and Grisolle he emphasizes what he calls the independence of the organs in their relations to each other. "In this period of life," he says, "the organs seem, as it were, to become independent of one another; they suffer separately, and the various lesions to which they may become subject are scarcely echoed by the economy as a whole."

We must admit the reality of this conclusion, and we ought not, in a clinical sense, to pass the observation by in silence. But it is not sufficient to agree simply with this remark, it will be interesting to discuss its real value. In this case again it is because authors have for too long a time regarded senility almost exclusively in its pathological phase that most of them have fallen into an error, not of observation but of interpretation.

What must we understand exactly by this isolation of the organs, or, if the term is preferred, their independence? A careful reading of the existing works on old age gives us the answer to this question. We find in all of them the opinion that disease in the aged is accompanied most frequently by very feeble general reaction, and the conclusion which the writers seem to think is justified by this is that the organs live each by itself in old age and that each suffers separately. This subject deserves a brief study.

Thermometry in the Aged.—First of all it is not correct to say that old people react so slightly as is assumed to general diseases. I admit that thermometry in the aged appears to be an argument of great importance and that very frequently we find temperature curves showing only 38°, 38.5°, and seldom 39° C. (100.4°, 101.3° and 102.2° F.) for diseases which in the adult would be marked by a temperature of 40° C. (104° F.) or over.

We must not forget, however, that sometimes in the axilla the temperature in the aged is very nearly normal, while in the rectum the thermometer will show a temperature corresponding nearly to that which we find in the adult patient suffering from the same disease. This is

an important fact to be borne in mind in comparing these two periods of life. All the reasons which have been given against the endeavor to appreciate temperature by the hand are just, especially in the case of the aged, for we shall find that ordinarily their extremities are cold even when the thermometer in the axilla might show a febrile temperature. But, as I have just said, even the latter method of determining the temperature is often very deceptive, for while the mercury may show only 38° C. (100.4° F.) in the axilla it may rise to 39° or even 40° C. (102.2° or 104° F.) in the rectum.

To return, however, to what we were saying, that even if in a general way the febrile temperature is less elevated in advanced age, if the morbid states are less noisy in their symptoms, and if the disease processes are more calm, it is nevertheless not correct to argue from this that there is an absence of organic association, or to believe too much in an independence of the organs. That this is incorrect I shall endeavor to prove on the basis of the conception of senility which has guided us hitherto.

It is only recently that authors have made a distinction between the diseases of old age and disease in the aged. I have already touched upon this question several times, and it is difficult to understand why these two classes of morbid conditions were so late in being differentiated. By diseases of old age we must understand morbid conditions determined by the alterations of texture of the organs, and the functional modifications associated with these changes of texture, dependent solely upon the senile process. All the others are diseases common to all ages. It is with these that we are to occupy ourselves specially in this section, and I shall endeavor to show in what way the old people bear these maladies. It really seems as though observers refused to accept this natural distinction, since they have insisted upon the absence of reaction in the aged and have treated exclusively of morbid conditions peculiar to old age. In this case the absence of reaction is really a prominent feature worthy of attention, but its explanation is easily made. In diseases in the aged clinical experience argues against the theory of independence of the organs; senile reactions are so marked and so evident that they cannot be mistaken, but observers have placed them in the category of exceptions. On the contrary, however, they are the rule, for the old person feels, suffers, and reacts just as do people in all periods of life; but, as in the case of all the other functions, those which are necessary in order to feel and to express are slower and less active than in adult life, but there are the same relations between them as at other times and it is important to bear this prominently in mind.

The physiological functions in the aged undergo certain general

modifications which may be stated briefly as follows: There is a retardation in the organic changes, that is to say, the sum of vital reactions is lowered and they are not produced with the same intensity as during the period of growth or in adult life. But that in no sense implies that any functional separations have been produced in the economy so that each function should act on its own account and independently of the rest of the organism; we cannot admit that there is any isolation or independence of the individual organs. The bonds which unite them in function during adult life remain the same in old age, except that the intensity of their relations is diminished. We cannot then accept such a view of senility. Biologically it is erroneous, and clinically it is apparent much more than real and rests upon a confusion which may easily be avoided between the diseases of old age and disease in the aged. I have thought it well to dwell upon this point, which might at first seem to be a purely controversial subject, but which is of considerable importance and is moreover easily proved. We see therefore that it is preferable to regard the old man as forming one complete whole, in which, however, the features of disease sometimes appear blunted. It is by a certain resistance which the harmony preserved between the functions gives to the entire economy that we may explain the impassibility of the senile organism under the blows of numerous diseases which are less frequently able to overcome him than is usually supposed.

We must not, however, argue from what I have just said that the senile organism acts like the adult in the presence of diseases. There exists a very sensible difference, consisting in a diminution of the organic reactions which diseases usually provoke. This diminution is undeniable, but it has been interpreted by different writers in a way which does not seem to me either physiological or always clinical. I believe, however, that in the present state of our knowledge concerning senile evolution, we may interpret it more exactly. Thus observers insist on the absence of reaction in the aged in the case of biliary calculi, and this example is usually chosen to prove the independence of the liver and the slight effect upon the general economy of biliary lithiasis. I believe, however, that these facts are capable of an entirely different interpretation. But first of all we must not confound hepatic colic with gall-stones. It is not rare to find gall-stones at the post-mortem examination when the individual during life never had any symptoms of hepatic colic; the same fact is also observed sometimes in adults, so that we must accept any theory based upon such findings with some reservation. But what explains better the slight effect of biliary lithiasis in advanced age is that the presence of gall-stones in a case due to

general retardation of the functions in consequence of senility ought not to disturb the hepatic function, but rather should be an expression of the new mode of functioning of the liver associated with increased age. In such a case there is no reason why there should be any reaction on the part of the organism. We may recall also what has been said above concerning senile xerosis of the kidney. The urinary function is modified, it becomes the same as that which is encountered in certain pathological states of the kidney, and nevertheless the economy accommodates itself to it, and we find no general symptoms. The explanation of this is the same as that given in the former example, for the trouble observed is simply the new state of being of the organism and is not a pathological condition. The hepatic and renal functions thus modified are not, properly speaking, disturbed functions but really normal functions.

Fever.—But leaving aside these facts, to which we shall return, I desire here to study more especially the manner in which the senile organism supports diseases which may assail it independent of any cause residing in senility itself. I shall limit myself to a review of the principal phenomena by which the economy ordinarily manifests its struggles or its distress. Fever will naturally occupy the first place in this study. It is, moreover, a study of this symptom which has served as a basis upon which to establish the theory of organic dissociation in advanced life. It may be worth while to pause for a few moments to review the theories which have been proposed in explanation of fever. We shall thus see the relations of fever to general organic functions, and we may then more definitely explain the modifications which it undergoes in advanced life during the period in which the functional activities are diminished. Of all the theories of fever that which is almost exclusively accepted at the present day is the one which regards an elevation of temperature as due to a disturbance of the vasomotor and calorific centres. Experience and observation are in accord in showing the frequency of an infectious origin of fever. In these cases there is an entrance into the economy of a septic pyrogenous matter which has as its material result to increase in extraphysiological proportions the activity of organic combustion. We might for a long time discuss whether this increase of activity in combustion is due to a direct fermentation or whether it is necessary to assume the intervention of a disturbance of innervation. I would not presume to decide this point, and moreover, I do not see of what special utility a decision would be as regards the subject which we are now studying. That which is of more importance is to know whether during old age the organism is in a condition in which its normal activities can be greatly exaggerated. In other

words, is there in senility anything which would prevent at a given moment the organic combustions from being carried to a point incompatible with health, and therefore determining a febrile pathological condition? We know that during old age the vital activities are gradually reduced in intensity; but we know, on the other hand, that combustion still goes on, that the vital activities preserve a constant relation between themselves, and that the normal condition in the aged consists precisely in this constancy of relation. Fever then may exist in the aged, and, as in the adult, it will result in an increased activity of intracellular combustion. But the question should be put in a different way, and we must see in what the lowering of the normal activities which is proper to senility is influenced by the febrile movement, and conversely how fever may in its turn be modified in an organism in which the vital activities are at their minimum.

The first question is the more easy to answer. An analysis of the urine shows clearly that during fever in old age, as in adult life, the pyrogenous process exalts the phenomena of combustion. In this respect, consequently, there is no change, and this is an argument of great importance in refutation of the theory of functional indifference of the aged, showing as it does that it is incorrect to maintain the idea of an independence of the organs, even in cases of extreme old age. In proof of this I may report the following history of a patient in my service at the Hôpital Sainte-Marguerite:

The patient is 87 years old. For about seven months he has been suffering from a rather rapidly progressing cachexia. The urine has been very regularly examined, and the temperature has been carefully taken; the condition of the heart, of the pulse, and of the respiration has been carefully noted, and we may read in these various curves the changing conditions of the patient. In him a succession of infections from the digestive tube and the urinary tract, which we might call autochthonous infections, is shown by a marked febrile condition (38.5°, 39°, 39.5° C.—101.3°, 102.2°, 103.1° F.), and it is only necessary, guided as we are by the thermometer and by the occurrence of certain other symptoms, to modify the diet and to resort to internal disinfection in order to cause rapid defervescence. Once also a slight traumatism was the evident cause of fever and twice a general chilling of the surface excited a bronchopneumonia, accompanied by fever. All these intercurrent affections were recovered from and the patient continues his progress towards decrepitude and final annihilation, without our being able to discover any sensible influence of these pathological conditions upon the evolution of his senility.

This is a very clear example of the slight influence which the lowering of vital activities may have on the febrile phenomena. It

shows at the same time how little isolated one from the other the different organs of the economy are, even in the very aged, since the suffering of one of them is echoed in all the others by a general reaction.

But there is another point demanding our study, which is of even greater importance, and that is how fever is influenced by an organism in which all the vital activities are diminished in considerable proportions. Here above all we must not forget this biological notion, upon which I have so often insisted, of the mutual dependence of the parts of the organism upon each other. I have shown differentiation and specialization dividing up the mass of living matter into a great number of separate individualities, fulfilling each a definite rôle for the profit of the community, and receiving each in its turn from the latter the means of defence and of repair. I have shown that this harmony may continue without interruption as long as the individual lasts; and it is the loss of this harmony in the aged to which I have given the name of disease. As long as the harmony is not disturbed the constancy of the relations is naturally maintained, and what is modified by age is merely the sum of the functional activities. It is therefore not to be supposed that senility can influence very much the febrile phenomena or especially that it can suppress them. If a pyrogenic agent invades the organism it will provoke an increased activity of internal combustion which will be manifested by an increased temperature. And here I would recall once more what I said above, namely, that it is not sufficient to note an absence of febrile temperature on the surface of the body to conclude that there is no fever and consequently to assume an absence of reaction in the aged. And, as it was this assumed absence of reaction which first attracted the attention of clinicians and led them to regard senility as a period of life in which the organs have, in a certain measure, lost their mutual relations, we may say that this idea is based upon an error of observation. Moreover, there are many temperature tracings which would prove that in old age there is sometimes a very high temperature and that the fever is, as in the adult, in relation to the nature of the disease, the kind of lesion, and the extent to which the entire organism is involved. While, in general, we may say that the temperature is not so elevated as during childhood, still we find its degree seldom so proportionate to the degree of lowering of the normal activities as to lead us to suppose that it has not been influenced in any considerable extent.

From this rather long discussion we may conclude practically that fever is real in the aged and that it is met with in them in all "febrile" affections, that it is ordinarily less violent, and that it

is not always evident on the surface of the body, so that we must look for it by rectal thermometry. Even more than in pediatric practice the use of the thermometer should be constant in the aged, and the temperature should always be taken in the rectum.

General Pathological Manifestations.

I desire now to describe briefly the modifications which the great symptoms of disease may undergo in the aged. In order to do so I shall pass rapidly in review the different general functions in order to see whether senility may in the course of a morbid condition cause symptomatic changes having any semeiological value from which we can profit.

Circulatory Phenomena.—We observe a very characteristic fact in the aged, in the absence of pathological conditions, to wit, that several functions do not appear to undergo very great variations, comparing them with the same functions in normal adult life. The circulation and respiration are especially in this category. A study of the cardiac contractions shows, although there is a tendency to exaggerate the importance of very slight differences, that the normal senile heart functionates much as does the younger one. Thus it is doubtful whether the figures obtained from a very large number of observations would show the existence of any actual difference in the number of pulsations in the adult and in the aged. The average pulse in the healthy man of middle age is taken at about 68 to the minute. Leaving aside all the cases in which I have noted a pulse of less than 68 (and these cases are more frequent than are usually supposed) in order that I may not be accused of having taken, to make up the average, examinations of individuals having a cardiac lesion causing unusual slowness of the pulse, I have seldom found among the old men at the Sainte-Marguerite a pulse of more than 72 to the minute. Averages have been given of 75, 77, and even 78; but other observers have found lower figures, 73 for example. The averages given (65 to 70 for the adult, 70 to 75 for the aged) are too near together to make the difference of any special importance. We may, therefore, legitimately regard old age as devoid of any marked influence upon the cardiac function in health.

Let us see now whether it is the same when disease strikes a man in advanced life. According to the conception of senility which I have defended in this article, there ought to be a marked difference, and clinical facts do show that the frequency of the febrile pulse varies greatly according to the age. Acute pathological conditions in the aged are accompanied by a pulse which, although febrile, is in

general less rapid than we see in the adult under the same conditions; in other words, the internal temperature in the aged may be quite elevated while the pulse may not be more than 80 or 90 to the minute. A study of pneumonia, examples of which are so common in homes for the aged, teaches us two things which bring out very clearly the influence of diseases on old age. In the first period of the malady the characteristic symptom seems to be a want of reaction, and almost always the sign which first directs attention to the disease is an acceleration of the pulse. But this acceleration is very slight; the presence of a pulse of 85 or even 80 should lead us to suspect a morbid condition, for the old man whose pulse is 80 has almost certainly a fever, and the thermometer in the rectum will perhaps show an elevation of 38° to 39° C. (100.4° to 102.2° F.). Before entering into an explanation of why fever in old age provokes such a slight cardiac reaction we must continue our observation of the old man suffering from a pathological condition; for in proportion as the evolution of the fever progresses the pulse will show notable changes in character. The longer fever lasts in the aged the more rapid is the pulse; and if we continue to register the pulse and temperature curves in pneumonia, for example, we shall see that by the fourth or fifth day of the confirmed disease (we must remember that the latent period of pneumonia may exist for a long time in the aged), the pulse rate will rise and approach 100. This acceleration of the pulse is even an important prognostic sign. If it increases we note at the same time an aggravation of the physical signs and of the general condition, so that one may almost always arrive at a very definite prognosis from a study of the pulse. I have often remarked that a pulse of 120 in the aged is of fatal prognostic import, and this has constantly been realized. We may then say that, in acute conditions in old age, the circulatory apparatus acts as in the adult except that it does so in less pronounced degree, the reactions in advanced age being less marked.

This is now the place to seek for the explanation of this phenomenon and to reply to the question above asked as to the reason for the diminution in the number of cardiac pulsations in the aged patient with fever. It is because of the lowering of the coefficient of organic resistance. The heart of the aged person tires more easily.

Writers in general agree in giving an explanation of this which has become classical. It is because of the absence of reactions in the organism in advanced age. This explanation is the literal interpretation of the facts observed. It is necessary, however, to add that this defective reaction, upon which is based the assumption of the independence of the organs in the economy in old age, is only the result of a diminution of vital resistance, a diminution which lessens the

senile organic reactions as well in health as in disease. The clearest proof of this seems to me to be furnished by the course of the cardiac reactions during fever. As soon as the latter increases, the heart increases its movement, just as in adult life, and the pulsations reach a figure above the normal. But how feeble is this augmentation in the aged! A temperature of 38.5° or 39° C. (101.3° or 102.2° F.) would easily excite in a middle-aged person with pneumonia a pulse of 100 to 110; during old age, on the contrary we see only 80 to 90 pulsations corresponding to an equal elevation of temperature. When the temperature rises, when the condition is aggravated, the pulse becomes more rapid; but while in the adult it might reach even 140 or 160 without immediately menacing life, we find that a pulse of 120 seems to indicate the maximum of resistance which the senile heart can offer without failing. Furthermore, auscultation of the heart in cases in which this rapidity of pulse continues for even a short time, gives us all the signs of approaching heart failure. The senile cardiovascular apparatus is therefore in a state of lessened resistance and under the influence of some accidental pathological condition it manifests evident signs of deterioration.

Respiratory Phenomena.—It is very rare in the normal condition that respiration in the aged has not undergone some modifications, the responsibility for which does not rest solely upon the senile changes in the lungs. It seems as though by its very function this organ were more directly menaced. It wears itself out in functioning like all the other parts of the organism, but it suffers more than any other of the organs from external injurious causes. Since I have been making autopsies on aged people I have not found a single lung which did not show very appreciable evidences of chronic disseminated pneumonia, due in most cases to the introduction of foreign matters. Pneumonoconiosis is not a negligible factor, for it restricts the field of hæmatosis. We must add, furthermore, that the agents of the respiratory movements lose a part of their energy and gradually oppose a greater resistance to the enlargement of the chest. These two causes amply suffice to explain the greater frequency of respiration in old age which observation shows to exist. It also explains why in acute affections in the aged increased respiration is one of the most marked characteristics. Many observers have noted shortness of breath accompanying fever in old age, and under the influence of even the slightest elevation of temperature we see the respirations increase from 22 to 24 (the normal figure in the aged) to 30 and more, and this even when the cause of the disease is outside of the thoracic cavity.

It is easy to understand, without the necessity of entering into any

long explanation, that the number of respirations, contrary to what we have seen in the case of the pulse, has no very definite prognostic significance. Shortness of breath may be very pronounced and yet the old patient may recover. The explanation of the frequency of respiration is easy. The inspiratory and expiratory forces are lessened, but the need of oxygen persists; and in fever, that is to say, in acute maladies, the exaggerated vital activity demands a more intense hæmatosis; whence results an acceleration of respiratory movements, an acceleration which compensates in number for the diminished amplitude of each individual respiration.

Urinary Function.—The importance of the urinary troubles is far greater than that of the pulmonary, and this is another proof in favor of our mode of regarding senile degeneration. If the respiratory function bears better than any other physiological one the assaults of disease it is because it plays in the economy a rôle which is in some sort passive and because the general lowering of activities leaves it still a facility of functioning which is more than sufficient for the needs of the organism. The same is not true of the urinary function. This is the one intended for the depuration of the economy, and the least irregularity in it is felt throughout the entire organism, which is thus left impregnated with the residue of organic combustion. I cannot here make a complete study of the senile kidney and I will only recall that normally the old person presents modifications in the texture of the urinary organs and in their functioning, that this diminished function, however, is in harmony with the lessened vital activity of the organism, and that thus any morbid complication is averted. But this harmony is very precarious, and the relations may easily be broken. This is indeed what we observe in the study of the pathological conditions. The least indisposition, the slightest febrile state has an important influence upon the urinary function in the aged. We see the amount of urine rapidly diminish, and this, as in adult life, is the first effect noted; but in the aged it leads to far more serious consequences, and we may say that the fragility of this function is in direct proportion to its importance. It is easy to follow the influence of disease on urinary secretion in the aged. In examining the urine of the aged inmates of the Hôpital Sainte-Marguerite who are admitted to the infirmary, and in continuing these examinations during the course of the disease from which they happen to be suffering, I have been able to see what a considerable influence the disease had on this function, and conversely. This is easy to explain. In the febrile condition the vital activities are exaggerated, the materials to be eliminated are increased, while the liquid serving for their dilution is diminished. On the other hand, the senility has modified the

secretory organ, and has lessened its functional power. The logical and inevitable consequence of this will be a rupture of relation between the quantity of products to be eliminated and the eliminating power. There is in this fact a very actual danger for the aged patient. The physician must be constantly on the watch, and he ought in the case of any acute affection in an aged patient to look with especial care to the urinary function, which at this time, more than at any other period of life, threatens the patient with intoxication by the products of increased vital changes caused by the fever.

Nervous System.—In a general way the nervous system in old age follows the law of diminution of the functions, but we have few facts in regard to its functioning considered in relation to the maladies which may affect the aged. Sensibility, both general and special, is blunted, and the nervous reactions are decreased. It seems actually as if pain were less acutely felt, for in affections in which pain is usually a prominent symptom it is less evident. This clinical fact is of importance. It explains the want of tone in the febrile reactions, and the slightly accentuated character of the beginning as well as the course of acute diseases in the aged. It is indeed the reason which, as I have already said, has led to a belief in the independence of the organs in old age. I have shown elsewhere that we cannot accept this interpretation of the facts.

Special Pathological Conditions.

By this rapid review of the changes in the great functions in the aged, I think I have shown the necessity of a very careful examination of every old person who may be even slightly indisposed, and of watching with care over each of his functions, the harmony of which, precarious even in health, is too easily disturbed by the slightest morbid state, although the external manifestations of the latter are often obscure. While the pathology of the child stands out in bold relief, that of the aged does not, for here the picture is in half tones. Thus observation of disease in the aged is a much more delicate matter than that of pathological conditions in childhood. The physician will have to search for the lesion, detect it when expressed by often obscure symptoms, and bear constantly in mind its possible modifications and complications; and in this he will often be guided by no signs. We must, as it were, strip the old man in order to detect the affection which he so carefully conceals. If to this difficulty we add that the therapeutic results are less distinct and slower and that the longer morbid cycle demands a more sustained attention, we shall readily understand why the pathology of old age

has had fewer explorers. Being less brilliant, it attracts less, and that is why it is still very difficult to glean in the different works on old age sufficient data to make a solid and distinct whole.

Nevertheless, I shall endeavor to pass in review the various diseases and to note as clearly as possible what they become in the aged. This picture will necessarily be incomplete, often poor in details, but one must not demand too much at first. I shall take up successively general diseases, the dyscrasias, and diseases which affect the various systems, such as the digestive tube and its annexes, the respiratory passages, the heart and its vessels, the urinary apparatus, and the nervous system. Finally, I shall close with some considerations upon the indications for surgical treatment which senility may furnish.

Infectious Diseases.

Measles.—All the exanthemata may be encountered in the aged, even measles, which is usually regarded as a disease peculiar to childhood. It is, however, rare in the aged, for the reason that a person in advanced life has usually had the affection in childhood and therefore enjoys the natural immunity which a first attack confers. Its course is the same as in the adult, but there is a very slight reaction and the eruption is paler; it is, as a rule, rather grave, and we must fear pulmonary localizations because of the *locus minoris resistentiæ* which is presented by the old man's lung, weakened by sclerosis, emphysema, and the tendency to stasis and passive congestion, dependent upon dilatation of the right heart.

Smallpox is also encountered with its usual symptoms in the aged. Even more than in the adult we must fear for cardiac localizations, the heart being rarely normal at this period of life, and usually presenting, if not some special degeneration, at least xerosis due to the natural evolution of the living being such as I have sketched it in the first part of this article.

Scarlatina has also been observed, and it was long ago noted that in the aged it presents itself with certain irregularities which give it a new aspect. Often the picture is incomplete, one or more symptoms being absent, or presenting themselves in an attenuated form which is equivalent to absence. Frequently we observe anomalies. Lasègue has said that "after puberty scarlatina presents many anomalies, and the nearer we approach senility the more rare and incomplete does the scarlatinal type become."

Typhoid fever is frequent in the aged. It is one of the infectious diseases which have been the best studied; it very often develops with abnormal symptoms in all its stages. The onset is more insidi-

ous than it is in the adult, and at the beginning it may very readily be mistaken for a simple indigestion with symptoms of autotoxæmia of alimentary or other origin. The headache which is so marked in the first stage is often absent in old age, and so also is epistaxis. The fever is not high at any time in the course of the disease, and the laws which preside over the progressive elevation of temperature are disturbed; the contrast between the temperature and the pulse is less marked. After the disease has become established the rose-colored spots may be very few in number, pale, and of short duration, or they may be absent altogether. The abdominal symptoms are inconstant: the gurgling in the right iliac fossa is but little marked, there is nothing characteristic about the diarrhœa, and the swelling of the liver and spleen is slight. The abdomen may be distended because of the senile relaxation of the tissues. In contrast with the symptoms thus far mentioned the bronchopulmonary signs are in general very marked and are certainly more dangerous. In place of the slight bronchitis which we commonly see in the adult, we usually find in the aged engorged lungs with stasis and congestion of both lower lobes, and some centres of hepatization, the latter being dependent possibly more upon infarction and atelectasis than upon true pneumonic inflammation. The pulmonary symptoms are, in a word, more lasting, more passive, but also more grave because of the condition of the lung at this time of life.

The general condition of the old person affected with typhoid fever is ordinarily bad, the adynamic form of the disease is readily established, and the old man with slight local symptoms grows more and more exhausted in consequence of the diminished vital resistance. When the disease tends towards recovery, convalescence is always long and tedious. Death, even when all seems to be going well, is not rare, for the organism is unable to carry on the work of repair, and the heart, lagging behind in the struggle, ends in unforeseen syncope which carries off the convalescent.

Certain therapeutic indications flow from this special evolution. The physician ought always to be ready to combat the almost fatal adynamia; he should institute a tonic treatment; he should be on his guard against respiratory complications, avoiding pulmonary stasis, doing what he can to increase the circulation in the lungs, and watching over the heart, especially the right heart. Finally, advanced age is often a contraindication of cold bathing, which is such a valuable aid in adult life. Cold enemata systematically administered have given me the same results as cold bathing. Very rarely, indeed, can the Brand method be carried out strictly, not necessarily because of the age (for an old man, not very senile, will readily bear being put into

cold water) but because of the cardiac and vascular changes. As a rule we should prefer tepid baths, with or without affusion of cold water, or better yet tepid sponging rapidly carried out. We should never forget in these cases to prescribe heart tonics, such as caffeine or theobromine, and generous stimulants, such as tincture of cinnamon, cognac, wine, ether, etc.

Influenza also presents itself in the aged under a special form. This disease, which already is so irregular in its nature, becomes still more so by reason of the age of the patient. The pulmonary manifestations are not so acute as ordinary, but they are less evanescent. Prostration is the rule, the patient being very rapidly overcome by the infection. We should direct all our therapeutic efforts therefore against the general adynamia and especially the cardiac atony. Alcohol under all its forms, especially in the more stimulating ones (toddy, champagne), caffeine, digitalis, and acetate of ammonium should be ordered. It is probable in these cases, and more especially in cases in which cold bathing in contraindicated, that digitalis in large doses will produce good results by its double action upon the heart and lungs. Le Gendre has recommended strychnine as a general stimulant. In the aged especially we must not neglect general hygiene and respiratory hygiene in particular. To give the patient fresh air and in sufficient amount, while avoiding all chilling of the body, is a rule from which the conscientious physician should never depart.

The other infectious diseases present less interest because of their rarity. They have all, however, been observed. *Typhus fever*, *cholera*, *miliary fever*, *mumps*, and *malaria* commit ravages in old age as in adult life and childhood. All these diseases declare themselves in the aged with certain common tendencies. There is but little general reaction, and adynamia is frequent, and in such cases the therapeutic indications are for the exhibition of general tonics and heart tonics, and for watchfulness as to the state of the lungs. It would be tiresome to repeat in the description of each disease observations which would differ but slightly in each case. As regards measles, however, we would note the extreme rarity of metastasis to the testicles, and as regards malaria a tendency to chronicity and to the occurrence of malarial cachexia.

Acute *erysipelas* develops in the aged just as it does in the adult as regards its general features. However, the initial chill is less intense, the vomiting at the commencement of the disease is rarely absent, the eruption is usually more pale, and the fever is not so high; cardiac complications are frequent. Durand-Fardel has observed that chronic and relapsing erysipelas are far from being

rare in the aged, especially in old women. He has reported many cases in which attacks of slight intensity occurred in a series, constituting almost a chronic erysipelas, but divided into phases by temporary remissions, and ending in a sort of elephantiasis through chronic inflammation of the skin and cellular tissue. These cases of erysipelas are rarely directly fatal and occur with but little general reaction.

Gout and Rheumatism.

Acute articular *rheumatism* may be seen in the aged, but it is not the rule. We more frequently see at this time of life lesions of chronic rheumatism and the ankylosing, dry forms of arthritis, developing slowly, seldom painful or only intermittently so. In these forms salicylate of sodium is usually of no avail and better results will be obtained from arsenical preparations and the iodides, administered for a long period.

As regards *gout* the same remarks will apply. It is rare that acute gout occurs in an old man for the first time and in any case its crises are less severe. It is quite common in practice among the aged to encounter chronic gout, beginning as such and not succeeding an acute attack, which is characterized by a minimum of pain coinciding with a maximum of deformity.

Venereal Diseases.

It is needless to say that the old man is as liable to suffer from these affections as is the adult or the adolescent, in case he exposes himself to contagion. But these diseases seem to assume a special form in the aged, in consequence of the defective resistance of the organism. Thus *chancroid* has a greater tendency to become phagedenic. *Gonorrhœa* is less acute, and develops more slowly, and its ascending infections are favored by the urinary troubles and kidney lesions common in the aged. In the case of adenopathies resolution is more tardy.

Syphilis is especially grave in the aged, other things being equal. The primary lesion is sometimes the point of departure for a serpiginous ulceration which is very rebellious to treatment, and sometimes also there is a sloughing of a wide extent of the surface. Secondary accidents are almost the same as those observed at all ages, that is to say, very irregular in duration and in intensity, and being, furthermore, of no prognostic significance as regards the gravity of the infection. On the other hand the tertiary symptoms, which in the aged follow very close upon those of the secondary stage,

are always alarming as well by reason of their intensity as by that of the rapidity of their occurrence, which allows no time for the effects of the remedies to be manifested. Syphilis in the aged often terminates speedily in death.

Cutaneous Diseases.

The diseases of the skin in old age present few special features. We may note, however, the extreme rarity of those forms of cutaneous disease of which the types are impetigo and impetiginous eczema, which affect especially lymphatic children. There is in the aged a special atrophy of the skin, a senile atrophy, due chiefly to the gradual disappearance of the subcutaneous fat and to xerosis and then sclerosis of the organic elements. We may note also a pruritus which is peculiar or almost peculiar to the aged, which has received the name of *prurigo senilis*. This affection, which is remarkable for its obstinacy, is characterized by an eruption of unpigmented papules which are seen especially on the back, shoulders, and external surface of the legs. They cause an intolerable itching which is aggravated by the heat of the bed, leading to insomnia and to a condition of malaise and of suffering which is not devoid of danger; when it is in its extreme form this pruritus is so intolerable that it has even led to thoughts to suicide. Following it we see lesions due to scratching which open the door for all sorts of infections. Frequent baths, a mild diet, and the internal use of antiseptics constitute the best treatment for prurigo, which, as we have seen, is always grave, if not in itself, at least in its consequences.

I am tempted to class among the diseases of the skin those epitheliomatous growths, which are peculiar to the aged, which in older times were grouped under the name of *noli me tangere*. The reason why I would consider them here is that these growths always remain a local lesion, susceptible of cure by a purely local treatment, with no tendency to generalization or to the induction of cachexia. An almost infallible remedy for these epitheliomatous formations is chlorate of potassium.

Finally, the cutaneous affections grouped under the name of *purpura* are very frequently observed in the aged. The appearance of petechial spots is favored by the bad condition of the arteriocapillary system, which is rarely normal in the aged organism.

Digestive Organs.

Mouth.—Day observed a special aphthous eruption in the mouth of individuals of sixty years and over. It is seen especially in aged persons in whom the digestion is poor; it is found on the internal

surface of the cheeks, and on the tongue. Cauterizations of the spots with nitrate of silver are usually effectual.

Thrush occurs readily in the aged, especially in those suffering from prostatic and other urinary troubles. In these cases, in addition to local treatment, we must pay attention to the general condition, and combat the autotoxæmia of which the thrush is an evidence.

The other diseases of the mouth are, with the reservations which I have so often made in this article, the same in their general features as when they occur at other periods of life.

Pharynx.—The various diseases which may affect the pharynx (simple or specific anginas) present no peculiar features. Durand-Fardel, however, mentions a disease which would seem to be more especially one of the aged. It is a certain dysphagia which would appear to be due to anæsthesia of the mucous membrane of the pharynx and to paralysis of its muscles. It is manifested by a difficulty in swallowing, liquids esqecially, is unaccompanied by pain, and is more marked when the patient is in an upright position. It seems as though the buccopharyngeal reflex determined by the presence of food were abolished or greatly diminished. Canstatt and Day have also observed this affection.

Stomach.—Cancer is the most frequent gastric affection in aged persons. There is no special disease of the stomach occurring in the aged. It is true that anorexia and various forms of dyspepsia are seen frequently at this time of life, but there is nothing special about them. In the old man, as in the adult, they cause malaise, a feeling of fatigue, headache, sometimes cough (gastric cough), dyspnœa, palpitations, insomnia, and sometimes also a slight elevation of temperature. Dyspepsia in the aged is almost invariably due to two causes, namely, muscular inertia and hyposecretion. This same pathogenesis, however, is encountered in the dyspepsias of middle life.

Intestines.—The same atony and hyposecretion engender in the aged intestinal dyspepsia, flatulence, of which they so often complain, and almost constantly constipation, which it will be dangerous to neglect, since it causes a bad condition of the upper digestive tracts, favors autoinfection, and predisposes to cerebral congestion.

Liver.—The liver participates in the general deterioration of the organism; the evolutionary invasion of xerosis renders it less fit for the discharge of its functions. The normal transformation of toxins is slower and less complete, and the result is that the old man is less well armed against infections from within and from without. Biliary lithiasis is extremely frequent, but its chief characteristic is that it is seldom manifested by any symptoms. Hepatic colic is rare in con-

sequence of defective reflex of the excretory apparatus; most commonly we are led to suspect a calculus by finding symptoms of acute indigestion.

Respiratory Tract.

Larynx.—There is nothing special to note in this organ beyond the normal ossification of the cartilages, which betrays itself, however, by no symptoms and which constitutes rather one of the diseases of old age.

Bronchi.—Acute bronchitis develops in the aged with the same symptoms as in the adult, but unfortunately it has a deplorable tendency to become chronic. The bad local conditions in the lungs, and the heart and kidney changes are active factors in rendering the affection permanent. Then most frequently we are not in the presence of a bronchitis properly speaking, that is to say, a simple inflammation of the bronchi, but rather of more complex lesions which were denominated in their entirety catarrh by the older writers. This word has the advantage of expressing no theory, and of not giving to one of the localizations of the morbid process an importance overshadowing that of the others. Indeed, without wishing to return wholly to the ancient conception of catarrh, which included even pulmonary tuberculosis, we are forced to admit that the bronchitis of the aged, once it has become chronic, is never simple, but always complicated. Along with it we find emphysema, dilatation of the bronchi, several centres of induration and sclerosis, etc. These various lesions declare themselves by their ordinary symptoms, and it is very difficult to apportion justly to each one its proper rôle. Bronchitis constitutes a permanent danger in the aged; it becomes acute again upon the slightest provocation and threatens to extend to the smaller bronchial tubes; and capillary bronchitis is only too often the cause of premature death. Finally the changes in the myocardium and in the kidney of which I have already spoken possess an importance which we must not neglect in a case of bronchitis in the aged. The cardiac changes favor stasis and passive congestion; those of the kidney act through uræmic poisoning which affects the vasomotors of the bronchi either in their terminal ramifications or in their bulbomedullary origin (Marfan). We ought, therefore, always to auscultate the heart and make an examination of the urine in cases of bronchitis, and if we have the least suspicion of a complication of this nature, we must add the appropriate remedies to the ordinary treatment of bronchitis. The iodides, the heart regulators, with digitalis at the head and then sparteine, and all vascular tonics, such as ergot, will render great service. Milk, by favoring diuresis, and

saline purgatives, by eliminating toxins from the digestive tube, will preserve the patient from congestions of toxic origin which might carry him off unexpectedly.

Lungs.—It is in the aged that we find the lesions of pulmonary sclerosis at their maximum. This was long ago noticed, and Cruveilhier remarked that the senile lung, especially at its apex, was shrivelled, hard, and slate-colored. More recently Cornil and Ranvier have noted an osteoid transformation of the pulmonary tissue. Finally, normal anthracosis is more intense as the person is older. I simply recall these changes in order to show what a soil pulmonary diseases find in the aged. It is a classical fact that *pneumonia* in the aged develops in an abnormal manner. Hournan and Déchambre have recorded cases of old women who died of a sudden syncope while walking about, engaged in their daily avocations, and at the autopsy there was found hepatization of the lung which had been betrayed by no symptom during life. This, indeed, is the characteristic of pneumonia in the aged; the reaction is very slight, the disease develops in such an insidious manner that it may almost be called latent. At other times it assumes a masked form and presents the symptoms of cerebral apoplexy with complete coma, or a cerebral hemorrhage accompanied by hemiplegia. In common with all physicians I have seen cases of this kind; they teach us that we ought never to neglect auscultation of the lungs in the case of an old person presenting apoplectiform symptoms. Treatment of pneumonia in old people is in general the same as that of pneumonia in adult life. When cold baths are contraindicated, as they usually are, digitalis in large doses after Petrescu's method will give good results.

Bronchopneumonia in aged persons is perhaps even more grave than lobar pneumonia. It appears under different aspects and writers have described three principal types: 1. Regular acute bronchopneumonia, very analogous to that occurring in adult life. 2. Suffocative bronchopneumonia, characterized by extreme dyspnœa, cyanosis, rapid algidity of the extremities, and almost always coma. On auscultation we find the signs of capillary bronchitis more marked than those of hepatization. 3. Subacute bronchopneumonia, which is slow in its evolution, always lasting at least three weeks, and interrupted by periods of amelioration, which are unfortunately only temporary. The dyspnœa, which is slight at the beginning, increases progressively, and is especially marked during the night. There is but little fever, fine crepitant râles are heard over both lower lobes, and the patient gradually fails. The treatment of these different forms should consist in a tonic regimen, attention to respiratory hygiene, and the administration of digitalis and alco-

hol. Often counterirritation to the chest, frequently renewed by means of dry-cupping, and intestinal revulsion will produce unhoped-for good results.

There is one very interesting chapter in senile pathology which we may say is of modern creation, that, namely, which treats of *tuberculosis*, which for so long a time was said not to exist in old age. We know to-day that old age does not confer immunity from this terrible disease, but it puts a special stamp upon its evolution. Tuberculosis in the aged may be chronic or acute. The chronic form is characterized by an exceptionally slow progress, and by very few symptoms; the cough is slight, there is scarcely any expectoration, hæmoptysis is very rare, and the fever is slight, even when it exists. There is a general shrinking of the organism, accompanied by a progressive enfeeblement, and even more literally than in the case of the adult we may say that the patient is slowly dying of consumption.

The acute form assumes several different types: 1. A latent type: the old person complains of headache and vertigo; he grows thin without apparent cause; he does not cough, does not sweat, and has no fever; then suddenly syncope occurs and the person dies almost before he was regarded as ill. 2. A cardiac type: characterized by œdema, ascites, diarrhœa, shortness of breath, and cyanosis. The pulmonary symptoms are latent and death is as rapid as in the preceding form. 3. Cerebral type: here dementia predominates. The nucha is rigid and we note a cutaneous hyperæsthesia; the patient dies while we are trying to locate the cerebral and bulbomedullary lesions. 4. A febrile type, which resembles typhoid fever so closely as often to be mistaken for it. 5. A catarrhal type, which develops with all the signs of capillary bronchitis. 6. A pneumonic type: here there is a minimum of reaction and we are apt to think of an ordinary pneumonia. In the presence of these different forms treatment is generally powerless to arrest the progress of the disease.

Pleura.—The diseases of the pleura are the same in old age as in adult life, the two differing only by shades in their evolution. There is nothing peculiar about pleurisy in the aged, except that it is seldom primary; in the great majority of cases it follows pulmonary infarction, pneumonia, or a tuberculous lesion. Affections of the heart and kidneys in the aged often have pleural complications, but the trouble is then usually a simple dropsical effusion rather than true pleurisy. The symptoms of these secondary pleurisies are usually but slightly marked. The onset is insidious and there is seldom any severe pleuritic pain. The initial chill is usually absent and the shortness of breath is not pronounced; the temperature is but little elevated; on auscultation we detect the usual signs of pleurisy, but

the effusion is not abundant. The affection progresses more slowly than in the adult and it is always more grave because of its effect upon the heart.

Circulatory Apparatus.

Pericardium.—Acute pericarditis in the aged often passes unperceived, the symptoms being but slightly marked, and masked by the general organic deterioration of advanced life. The pericarditis is often chronic from the beginning and may be latent for a longer or shorter period. The dry form, ending in adhesions, is favored by the chronic changes due to senile involution.

Myocardium.—Writers on old age have often contrasted the hypertrophy of the heart with the progressive atrophy of other parts of the organism of the aged. Despite the observations of Brousse, however, I believe that this hypertrophy is rare. It is much more common at autopsies to find atrophy of the heart, and especially pigmentary atrophy (Friedreich). Other forms of degeneration are also encountered, the most frequent of which are fatty and sclerous degeneration. All these various lesions have but one result, namely, dilatation with its consequences. The heart is weakened, always in danger of dilatation, and consequently ready to cease to perform its functions. In all intercurrent affections of old age we must bear this peculiarity always in mind, for it is of great importance in a prognostic sense.

Endocardium.—The pathological processes affecting the endocardium are the same as those encountered at other periods of life. Old age has no other effect than to determine their localization about the aortic orifice more frequently than at the auriculoventricular orifices.

Vessels.—Sclerosis of the arteriocapillary system is very frequently observed in the aged. The older a person is, other things being equal, the more he has been exposed to various forms of intoxication or infection, which are such active factors in the production of pathological changes of the tissues, and especially of the vessels. Furthermore, as I have endeavored to show, even apart from morbid processes, the normal senile involution produces slowly but surely modifications in the vascular tissues. It is to the sum of these modifications attributed to the natural biological evolution of connective tissue that I have given the name of xerosis, in distinction to sclerosis, which implies a pathological and not physiological induration. I have shown that we may differentiate these two orders of lesions under the microscope, and have described the lesion in sufficient detail in the first part of this work (p. 456).

The arterial lesions due to senility assume a great importance by

reason of the changes which they induce in the physiology of all the organs. It is to them that is due in great part the diminution of intensity of metabolism, which shows itself by a lowering of the vitality of the organism. It is to them also that are due in large measure the local disturbances of circulation, which are sometimes of sufficient intensity to cause partial gangrene of the tissues. The term senile gangrene which has so long been applied to these lesions is an evidence that the fact has long been recognized.

Urinary Apparatus.

The urinary apparatus and its accessories are of all those in the body the most sensible to the influence of age. The *kidney* is frequently atrophied and indurated as a result both of the senile involution and of the irritation of the toxins which have filtered through it during the course of life, and the result is that the functioning of the organ is greatly affected. The aged are very frequently uræmic. They do not often present the symptoms of acute uræmia, which leave no room for doubt as to the diagnosis; but frequently they have malaise and slight indisposition, which is to be explained by a slow and moderate degree of intoxication, due to defective functioning of the sclerosed kidney. We must know how to recognize this etiological factor in the various morbid manifestations occurring in the aged, such as headache, vertigo, indigestion, diarrhœa, dyspnœa, pruritus, and reflex pulmonary congestions, all of which should make us suspect a mild degree of uræmic intoxication. We should never neglect to make an examination of the urine in the case of old persons, no matter how slight their malady may appear to be; and whenever the slightest indication is present, we should institute a régime in which the production of toxins will be diminished as far as possible (milk diet), and prescribe the iodides.

The *bladder* in old persons is frequently sclerosed and shrunken and it is subject to secondary inflammations favored by stagnation of the urine. Vesical calculus is very common in old age. To the changes in the vesical musculature and to the anæsthesia of the mucous membrane there is added hypertrophy of the prostate, which increases the difficulty of micturition and weakens the excretory apparatus, so as to make it an easy prey to various morbid processes.

Nervous System.

Neuritis, whether of toxic origin or not, presents no special symptoms in the aged. The same is true for diseases of the spinal cord, of the bulb, and of the cerebral peduncles. It is worthy of

note that diseases of the nervous system are much less frequent above the age of sixty than they are between the ages of thirty and sixty, and the only exception to this is found in cerebral hemorrhage and softening. *Apoplexy* is very frequent in the aged and is one of the most common causes of death, and we can easily understand why it should be so after all that we have learned of the vascular lesions which attain their maximum in the aged. These lesions favor the formation of miliary aneurysms and subsequent rupture of the vessels, determining the apoplexy.

Softening of the brain in the aged is almost always a central softening produced usually by the lesions of chronic endarteritis. It is much more rare to encounter in advanced life cortical softening, which is most frequently due to embolism, and which is observed commonly in adult life or in youth in the course of an infectious endocarditis. The treatment to be followed does not differ from that applicable to the same lesions at other periods of life. Intestinal derivation and counterirritation to the lower extremities, measures unfortunately very uncertain as regards arrest of the hemorrhage, will exhaust our therapeutic resources, and we can usually count more upon the natural arrest of the trouble than upon one due to our efforts. It is almost useless to say that recovery after a cerebral hemorrhage in old age is much more rare than it is in earlier life by reason of the lowered condition of the organism and its physiological tendency to sclerosis.

Accidental and Operative Traumatisms.

In an article so limited as this it is impossible to give even a simple sketch of surgery in the aged, and I shall content myself with indicating in a few words the general ideas which the physician ought to have concerning the treatment of accidental or operative wounds in the aged. Injuries are always more grave in the aged, and this for several reasons: the body is less resistant, reparation is more difficult, and the least accident suffices to determine a rupture of organic equilibrium, upon the maintenance of which depends the health of the aged notwithstanding their lowered vitality.

Among the *traumatisms* which are the more important, in that they bring out in stronger relief what I wish to say, are those which affect the osseous system. The gravity of fracture of the neck of the femur in an old person is well recognized, and it is a typical example of the weakness of old age in resisting traumatism. Fractures occur much more easily in consequence of osteoporosis; union occurs with great difficulty, and often in place of uniting the smaller fragment is absorbed and disappears while stimulating to greater activity the pre-

existent rarefying osteitis. The enforced immobilization which follows the injury leads to profound and often very grave modifications in the general health. The limbs become atrophied with surprising rapidity; metabolism is slow, the appetite is lost, and obstinate constipation is established, with consequent stercoræmia; the functioning of the kidneys is disturbed, which is another cause of autotoxæmia; the partly paralyzed bladder becomes inflamed, and the urine is often purulent; the lungs are invaded by reflex congestion; and in many cases the patient dies in marasmus, following a local lesion which in a younger person would have had as its extreme consequence a more or less marked lameness. It follows from these considerations that we need pay very little attention to local treatment in the case of an aged person suffering from fracture of the lower extremity. Whatever may be done, the orthopedic result will be always doubtful, and we must bear especially in mind that life is in danger and must pay particular attention to the general treatment. We should see to it that the patient is immobilized as little a possible, watch over the condition of the bowels and the state of the kidneys, prevent the production of toxins and favor their elimination by all the emunctories, and bear in mind the danger, in order to avert it, of pulmonary stasis and cardiac dilatation.

Operations.—Old age is not an absolute contraindication to surgical intervention, and we may always, barring exceptional circumstances, operate when necessary upon an old person, but we must redouble our precautions before, during, and after the operation.

Before operating it is well to prepare the patient by means of appropriate regimen and treatment. We should examine into the functional condition of his organs, analyze the urine, and auscultate with great care his heart and lungs. Very often before operating we must treat the chronic bronchitis, which is so frequent in aged persons, and the existence of which would imperil the success of the operation. At other times the heart, which is in danger of dilatation, should be toned up and be prepared to resist the tendency to syncope during the first inhalation of the anæsthetic. If there is renal insufficiency the patient should be kept on a milk diet some weeks before the operation, in order to favor as far as possible the elimination of the poisons which are always formed in greater abundance following a traumatism. A few doses of calomel will be useful in the same way, by stimulating the digestive tract and the liver.

It would be very important to determine which is the best general anæsthetic to choose for the aged, but in the present state of our knowledge I do not think we can decide positively between ether and chloroform. In France chloroform is most frequently employed.

The giving of this anæsthetic is always a difficult art and is still more delicate in the aged, by reason of their condition of lessened resistance, and of the vascular changes which are almost always present. We must, therefore, in the administration of an anæsthetic, observe two great rules: (1) Avoid giving large doses at once, which succeed very well in the child, but might be dangerous here; (2) shorten as far as possible the period during which the patient is under the chloroform—in other words, reduce to its minimum the quantity of the anæsthetic absorbed. The surgeon should always in these cases operate quickly. The nasal mucous membrane should be touched with a weak solution of cocaine in order to prevent the dangerous reflex at the beginning. The head should not be too low, in order to avoid the occurrence of cerebral congestion, which might lead to rupture of the weakened vessels. The patient should not be raised too quickly after the operation, for fear of increasing the cerebral ischæmia which is common in those suffering from arteriosclerosis. Finally, we should not forget to give one or two hypodermic injections of morphine shortly before the admininstration of the anæsthetic, and this especially in those who have been addicted to the use of alcohol. By observing these precautions we may almost always anæsthetize the aged with impunity.

After the operation the dangers which we must bear in mind are the same as those which we have discussed following accidental traumatisms. We must guard against a tendency to collapse, shock, autoinfection, reflex congestion, and retarded excretory function. The measures above mentioned should be employed, and to them we should add the use of tonics, alcohol, especially in those addicted to its use, and the diffusible stimulants.

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DISEASES OF CHILDREN.

(EXCLUDING INFECTIOUS DISEASES AND RACHITIS.)

BY

JULES COMBY,

PARIS.

DISEASES OF CHILDREN.

GENERAL CONSIDERATIONS.

As the infectious diseases are to be treated of in later volumes, I shall confine myself here to a study of two main groups of maladies, namely: I. General nutritive disorders or dyscrasias (excepting rachitis, which has already been considered in Volume VII.), and II. Organic or local affections.

I. The first of these groups may be further subdivided into: 1. Scrofula; 2. Arthritism; 3. Blood Disorders; 4. Diseases of Evolution.

1. Scrofula, although it has been despoiled of many of its principal attributes to the profit of tuberculosis, nevertheless still maintains at least a provisional autonomy.

2. Arthritism is a term which includes obesity, asthma, migraine, diabetes, etc., which are for the most part hereditary affections.

3. The diseases of the blood are hereditary (hæmophilia) or acquired (purpura, infantile scorbutus, anæmia, chlorosis, leukæmia, pseudoleukæmia).

4. The disorders of evolution comprise the troubles of growth, those of dentition, and athrepsia.

II. The second group includes the local or regional diseases, that is to say, the diseases which are localized in one organ or system of organs. Without doubt many of the diseases which are called local or organic are of an infectious origin, and in the case of some we can refer them to definite microorganisms. But these microbes act locally without involving the entire organism, and the anatomical classification is therefore justifiable; it ought also to be retained if only for the sake of order and a definiteness of description.

We shall study the diseases of organs in the following order: (1) Digestive tube and its annexes, (2) genitourinary apparatus, (3) respiratory apparatus, (4) circulatory apparatus, (5) nervous system, (6) organs of special sense, (7) integuments.

I shall confine myself, in the course of this study, within the limits of my subject, that is, the diseases of children. This will be an easy task so far as regards the diseases peculiar to children; but in the

case of affections which are common to all ages, in which I shall endeavor to confine myself to the peculiarities which these diseases may present when occurring in early life, this limitation, which is necessary in order to avoid useless repetitions, will not always be so easy to observe, but I shall do my best not to transgress it.

There is no doubt that infantile pathology differs from that of adults and of the aged, because of a difference not so much in the morbid species as in the soil which receives and nourishes the pathogenic agents. This soil, in the child, reacts with rapidity and a surprising energy; the symptoms are very pronounced, the evolution of the disease is rapid, the termination, whether favorable or otherwise, astonishes by its suddenness and unexpectedness. The child is quickly depressed and quickly raised up; we may have left him moribund and we find him full of life a few hours later.

The remedies exhibited to a child reach the emunctories very speedily, and an accumulative effect is almost never to be feared as long as the doses, although large perhaps, are prudently divided.

We must recollect that the nervous system of the child is very impressionable, and that it reacts exquisitely as well to therapeutic poisons as to microbic toxins. Opium will for this reason have a powerful action and one that is not without danger if the administration is not carefully watched; alcohol will act no less energetically, but in an inverse sense. Our therapeutic measures should be as far as possible of a hygienic order, and drugs should hold a second place; sick children need warmth, light, air, a suitable diet, and absolute cleanliness; their dwellings, including ventilation, heating, and lighting, and also their clothing, alimentation, and bathing must all be made the subject of special study.

One cannot be a good physician who does not accord to hygiene a rôle of the first importance in infantile therapeutics. I need not add that a children's physician must have certain personal characteristics and special aptitudes apart from his scientific knowledge. He must be gentle without being weak, must have a quick eye and promptness in action without being superficial, he must possess great delicacy in his employment of exploratory measures, and also an extensive professional experience; but all these qualities, which are for the most part easily acquired, are not sufficient to make a successful pediatric physician—he must above all *love* children.

GENERAL DISORDERS OF NUTRITION.

Scrofula, Lymphatism.

Our conception of scrofula to-day is not that which it was formerly, for since histology and bacteriology have shown us the presence of tubercle and of Koch's bacillus in scrofulous products (cold abscesses, caseous glands, white swelling, etc.) it has lost all the territory which tuberculosis has gained. Relying upon the facts adduced by anatomical and experimental investigations, some writers do not hesitate to erase scrofula from the nosological list; but we believe that they go too far. The major lesions of scrofula as formerly conceived—lupus, white swelling, and the like—are justly regarded to-day as forms of local tuberculosis, differing only in their slow development, their relative curability, their apparent attenuation, and their strict localization, from the visceral forms of tuberculosis which are more virulent, more inclined to spread to other parts, and more threatening to the life of the patient.

This much is understood, and we do not claim as scrofulous in their nature any of the deep lesions of the skin, mucous membranes, bones, or articulations, which might in former times have been referred to this disease. But with all these removed there still remains a special morbid temperament, often hereditary but sometimes acquired, which is called by some lymphatism, by others scrofula, and which we have here to describe in its clinical and practical aspects.

Scrofulous children are, some large and puffy, others thin and cachectic-looking; but all are weak, soft, and without energy. They are subject to obstinate and recurring cutaneous eruptions, such as eczema, acne, etc.; they have thick lips, a wide and flattened nose, flabby cheeks, blear eye; there is often a discharg ewith excoriation at the openings of the nostrils, the lymphatic glands are enlarged, the flesh is soft and flabby, and the lymphatic apparatus seems engorged with fluid.

Etiology.

Lymphatism and scrofula, like all the hereditary diathetic states, make their appearance especially during the later years of childhood, between the ages of five and fifteen years; but the morbid temperament may declare itself in the cradle, especially when the infant is living under bad hygienic conditions (artificial feeding, uncleanliness, poverty, etc.).

Scrofula is more common among the poor than the rich, in cities than in the country, and in certain countries or certain parts of one country than in others. A cold and damp climate, unhealthy dwellings where light and air are insufficient, improper or scanty food, all favor the development of the affection.

This development is also favored by the occurrence of certain diseases when they attack children living under the bad hygienic conditions above mentioned; among these "scrofulizing" affections are measles, whooping-cough, and typhoid fever. It is measles especially which favors the evolution of scrofula, and it is as a sequel of this disease that we note the persistence of a scrofulous ophthalmia, otitis, coryza, or eczema.

Scrofula is neither contagious nor inoculable; these are qualities which distinguish the tuberculous from the scrofulous affections. Very often, Lugol said always, scrofula is hereditary, but the form of this inheritance varies. All those influences which by enfeebling the parents may create a natural weakness or a hypotrophy of the children, will favor the development of scrofula in the latter. The heredity may be similar, and we then see scrofulous parents of scrofulous children, and sometimes even the children inherit from their parents the same manifestations with which the parents have been afflicted, such as ophthalmia, rhinitis, labial hypertrophy, etc. The true hereditary source of scrofula, however, is tuberculosis, more than half of all scrofulous children coming from tuberculous parents. Other causes of congenital scrofula are syphilis, arthritism, nervosism, consanguinity, old age, or extreme youth of the progenitors. Heredity indeed dominates the history of scrofula and of lymphatism; and this morbid temperament, habitually derived from tuberculosis and predisposing to the same malady, is thus united to it by multiple and firm bonds of consanguinity.

Symptoms.

We have not here to describe the gross lesions formerly referred to scrofula (caries of the bones, lupous ulcerations, fungous arthritis), for these belong to tuberculosis. There remain as scrofulous affections now only superficial lesions and a special facies.

The scrofulous facies varies according to the individual case, and we may distinguish two classes of scrofulous children, namely, the large and fat (florid scrofula) and the thin and emaciated (cachectic scrofula). But all are flabby, weak, without rebound, and without harmony in their structure; their arms are too long, their thorax is too narrow, their extremities too large and sometimes cold and

cyanotic, their lips too thick, their eyes bleared, the nostrils excoriated, and the glands of the neck, axillæ, and groins are hypertrophied. Some have red cheeks, light blue eyes, thick red hair, and *embonpoint* (scrofulous polysarcia); others are pale, anæmic, and thin, with dark or black hair. These are the features of the lymphatic temperament, upon which temperament, more or less well defined, are engrafted multiple scrofulous manifestations in the skin, mucous membranes, subcutaneous tissue, lymphatic glands, and special sense organs.

Among the cutaneous lesions we have to note eczema, moist, impetiginous, persistent, and rebellious to treatment, chronic or relapsing, localized by preference round the natural orifices of the head, the lips, ears, and eyes. This eczema, which forms scabs more or less thick incessantly excoriated by scratching, may spread to a distance on the body or extremities. When it is complicated by impetigo (staphylococcal infection), it may be accompanied by pustules, paronychia, conjunctivitis, etc. The popular term for scrofulous eczema in France was formerly *gourme*, a word indicating both the cutaneous, ocular, auricular, and nasal manifestations and the internal humoral lesions upon which the exanthem was dependent. From this conception, in part well founded, arose the disastrous and now obsolete therapy by means of permanent issues, setons, blisters, and cauterizations.

The eczema of the scrofulous opens the door to all manner of infections; streptococci, staphylococci, and tubercle bacilli may enter through its lesions and give rise to abscesses, ulcers, and glandular inflammation. In scrofulous children the least cutaneous irritation may find expression in obstinate eczematous lesions; thus head lice may by their bites cause eczema and adenitis, and uncleanliness of the scalp may produce the same result.

The soft tissues engorged with juices and with little resisting power suffer from the effects of the most insignificant traumatisms. It is not uncommon to see in lymphatic girls, following the piercing of the lobule of the ear and the wearing of earrings, the occurrence of an eczema, an impetigo, and sometimes even the complete division of the lobule which thus becomes bifid. Scrofulous eczema of the face may invade the cavities about the entrance of which it originated; thus it may penetrate the nose and cause chronic coryza, the external auditory canal and cause otorrhœa, or insinuate itself between the eyelids and give rise to scrofulous ophthalmia.

When the rhinitis is accompanied by a persistent discharge, the upper lip which is thus constantly irritated becomes hypertrophied and the seat of a diffuse lymphoma—the large lip of the scrofulous.

This hypertrophy may also invade the lower lip, and we sometimes see labial scrofuloderma extend to the cheeks or to the palate; the mucous surface of the lips cracks, becomes covered with crusts, and frequently is the seat of sanious ulcerations. If erysipelas appears all these engorgements increase, and the scrofulous child soon acquires gross and deformed features, having the leonine facies (leontiasis). If we examine the mucous cavities we shall find hypertrophy of the tonsils, chronic pharyngitis, hypertrophy of the lymphatic follicles (granulations of the throat), and adenoid vegetations; all these belong to the lymphatic temperament.

The acne of the face, like polymorphous acne of the body (acne punctata, pustulosa, phlegmonosa), is frequently encountered in the scrofulous, who are also subject to chilblains and to asphyxial lesions of the extremities (erythema pernio). Erythema a frigore is not the only form, and Bazin has noted in young girls an indurated erythema of the calf of the leg, which is distinguished from erythema nodosum by its site, its diffusion, and its chronicity.

Scrofulous localizations are especially frequent in the eyes, and the scrofulous ophthalmia may be primary or provoked by some acute disease such as measles. Its usual form is a ciliary blepharitis, a sort of eczema of the free border of the eyelids, resulting finally in a falling of the lashes. The conjunctival mucous membrane is attacked in its turn, and from this arises a slight discharge causing agglutination of the lids. The palpebral conjunctiva, which is chronically irritated, becomes granular, and the ocular conjunctiva becomes more vascular (scrofulous pannus). This may also be the seat of vesicles or pustules which, when they encroach upon the cornea, may end in corneal ulceration or chronic keratoconjunctivitis. Keratitis, a rather grave manifestation, may go on to perforation of the cornea, and often leaves behind it an opacity of the cornea. Associated with these forms of blepharitis or blepharoconjunctivitis, we sometimes see lacrymal tumors and chronic coryza. Often indeed it is the rhinitis which was the primary occurrence, the inflammation of the nasal fossæ being readily propagated through the lacrymal ducts to the ocular mucous membranes.

In the case of little girls a certain white, seropurulent discharge from the vulva, without urethritis or vaginitis, may be the expression of a scrofulous leucorrhœa. The discharge is not due to the presence of the gonococcus, and is curable by general treatment and by attention to cleanliness. These vulvar and vaginal complications are dependent upon the presence of the ordinary microbes of suppuration, the streptococci and staphylococci.

In the side of the respiratory apparatus we note various relapsing

and chronic manifestations, forms of bronchitis which are simple but which, under the influence of the scrofulous temperament, become chronic.

Finally we find that most of the lymphatic ganglia are engorged and increased in size.

Diagnosis.

When a child of five to ten years, boy or girl, is brought to us with swollen face, thick lips, nose stopped up, eyes red and blear, with eczematous patches round the ears and nostrils, and with hypertrophied cervical glands, the diagnosis of lymphatism or of scrofula is made at once; it is written in large letters on the child's face.

But the picture may be incomplete. We may see a pale, anæmic child, with chronic adenopathies, who comes from tuberculous or scrofulous ancestors; is the child scrofulous or tuberculous? We must not depend upon a direct examination of the lesion or upon experimental inoculation which is rarely possible. The course of the disease must for the most part be our sole guide. If the adenopathies heal without suppuration, if auscultation of the lungs gives negative results, we incline towards scrofula; but even suppuration and scars in the neck do not always imply that the affection is of a tuberculous nature.

When a child has scars on the buttocks and opacities of the cornea, hereditary syphilis is to be suspected and we ought always to try the effect of specific treatment.

Prognosis.

The prognosis will vary according to the seat and the extent of the lesions. A keratitis or a suppurative otitis is more grave than a blepharitis or an eczema of the external ear. A weak and delicate constitution and a bad hereditary history make the prognosis worse, for there is then always fear that the disease may terminate in tuberculosis. Every lymphatic or scrofulous child is predisposed to phthisis, and our endeavor should be to preserve him from dangerous exposure or contact with those already tuberculous.

The scrofulous lesions are slow in their development, are obstinate, and prone to relapse; they show little tendency to repair, the tissues of the body having a lowered vitality.

Every intercurrent disease will be modified by the scrofulous soil. As Ricord observed, syphilis is more grave in scrofulous subjects than in any others, and the same is true of the other infectious diseases.

In forming a prognosis we must take some account of the surroundings, of the climate, the humidity of the atmosphere, the

degree of cold, etc. There is no doubt that the scrofulous manifestations are worse during the winter and become less pronounced in summer.

Prophylaxis and Treatment.

When it appears to us that a child is predisposed to scrofula through hereditary influences we ought to remove from around his cradle all those depressing influences which might hasten the apparition of the diathesis. We must assure him a good wet-nurse who may supply him with breast milk for a long period. His childhood days should be passed in the country, much in the open air, far removed from urban influences, and he should be placed under the very best conditions as regards lodging and nutrition. He ought indeed to be brought up like a little peasant, strengthening the body by a life in the open air without fatiguing the mind. We should insist upon all those hygienic measures which increase metabolism, such as dry rubbing of the skin, salt or sulphur baths, cold douches, massage, open-air games, etc. The food should be abundant and contain a large proportion of nitrogen and phosphates (meat, dry vegetables, eggs, lettuce, fish, bread, etc.).

When the scrofula has once become established and localized it should be combated by both local and general measures. Some of these are applicable to all cases, others must be varied according to the diversity of the morbid localizations.

All scrofulous children, whatever the symptoms of the disease which they present, should receive during the winter cod-liver oil in progressive doses (two, four, or six tablespoonfuls). If this reconstituent of the first rank is not well tolerated it must be replaced by syrup of the iodide of iron, syrup of horseradish, or iodotannic syrup.

The ocular localizations are treated by the usual antiseptic collyria and ointments; the obstinate eczemata are often benefited by applications of cod-liver oil in the form of plasters or of compresses soaked in the oil; for the rhinitis or the otorrhœa irrigations, insufflations of powders, etc., are indicated.

When the condition of the eyes does not contraindicate it, a sojourn at the seashore is marvellously suited to the scrofulous, and it should be prolonged. If the children cannot go to the seashore they should be taken to some one of the chloride of sodium springs. The flabby and apathetic lymphatic patients do well at the seashore, even at the colder resorts where the winds are strong and the waves forcible. But nervous and irritable children should be directed by preference to the thermal chloride of sodium springs or to the warmer seaside resorts. When there are eczematous manifestations sulphur-

ated waters are indicated; when bronchitis is troublesome such waters as those at Challes or St. Honoré; and in cases of adenopathies the arsenical waters, of which La Bourboule is the type, are indicated.

If it were possible to prevent marriage between people who are delicate, tainted with tuberculosis, scrofula, or arthritism of grave type, we might do much in the way of the prevention of scrofula. Much might also be done to reduce the number of the scrofulous and rachitic by efficacious social measures destined to ameliorate the wretched condition of the poorer classes of the urban population.

Arthritism.

Before entering upon a special description of the hereditary diathetic diseases which are united to each other by evident bonds of relationship, I ought to endeavor to show what is this bond and to explain the general influence which presides over these multiple and diverse manifestations. In France we understand by the term arthritism a pathological disposition, a morbid temperament, which is transmitted from one generation to another, under one or another form, in moderate or marked degree, and which is characterized by a profound and permanent disturbance of nutrition, according to Bouchard a slowing of the nutritive processes (bradytrophia).

Arthritism does not attain its full development in the child, it exists there only in its germ, but a skilful physician can recognize it even then. It is the disease of the rich and cultivated, the ransom of fortune and of great positions acquired by intellectual overwork or by efforts of intelligence or of genius. The children of families who are thus tainted through one or several generations by gout, diabetes, obesity, asthma, migraine, gravel, various neuroses, etc., are exposed to the appearance later of the same maladies; and, if they do not eventually become affected with the same diseases, or before they become affected with them, they present a peculiar constitution and certain morbid tendencies which form the arthritic temperament.

How shall we recognize this temperament in the young child? If the baby, while nursing, suffers without any good reason and without any appreciable hygienic faults, from obstinate dermatoses such as eczema of the face and head; if later he is subject to habitual sweating of the face and neck, to discharges from the eyes and nose (sneezing, coryza, epistaxis), to attacks of pharyngitis, of laryngitis, and of bronchitis with spasmodic cough; if the appetite is irregular or excessive; if the digestion is weak and painful and accompanied by much flatuence; if the nervous system is over-excitable, if the child

is constantly agitated, excessively emotional, and irritable, and if he suffers from frequent headaches; if he is especially sensitive to cold, etc., then we may suspect the existence of arthritism and shall have to fear in the future the appearance of the diseases which we shall soon begin to study.

In arthritism there seems to be a special weakness with irritability of the connective tissue. "The skin, the mucous membranes, and the entire connective tissue seeming to be tissues made of a stuff which wears out and yields easily, the first indication is to fortify the skin and to shield the sensitive mucous membranes from all causes of irritation" (H. Cazalis). The treatment indeed should be above all hygienic. The functions of the skin should be stimulated by warm baths, dry friction with horsehair or worsted gloves, rubbing with alcohol, massage, gymnastics, and games in the open air. The clothing should be warm, and in summer as in winter the child should wear flannels. The house in which he lives should be dry, with a good exposure, and in a dry and warm climate.

Temperance in everything is indispensable; the meals should be abundant and taken at regular hours, the food should be of a mixed character (white meats, eggs, vegetables, milk, bread, and fruits), but the quantity of red meats, alcohol, and fermented drinks should be limited; the food should be slowly and thoroughly masticated.

Exercises in the open air are to be recommended, such as various games, horseback riding, fencing, and bicycling. Over-attention to studies and a sedentary life are to be forbidden. The children should live as much as possible in the country rather than the city. The Northern seaside resorts are not suitable for nervous and irritable arthritic patients, for such climates are too cold, damp, and exciting; but the warmer seashore, as on the Riviera, Southern California, Jamaica, Bermuda, etc., may be allowed. Among the sedative thermal resorts which may be commended to arthritics we have in France Néris and Bagnères-de-Bigorre. The lymphatic or scrofulous subjects of arthritism do well at Royat, St. Nectaire, or La Bourboule. Dyspeptic arthritics and those who are great eaters should go to places of the type of Plombières, Châtel-Guyon, etc.; the bilious to Vichy, Pougues; those with gravel to Contrexéville and resorts of a similar type; the arthralgic to Aix in Savoy.

Obesity.

Obesity or polysarcia, a disease of civilized peoples, of the dwellers in towns, of the rich, and of the lettered, is characterized by an exaggerated production of fat, of adipose tissue, under the skin

and in all the connective-tissue spaces; even the blood does not escape, for Ritter (of Nancy) found four times the normal amount of fat in the blood in cases of obesity.

Etiology.

Obesity is rare, exceptional even, in early childhood, and seldom shows itself before the approach of puberty; nevertheless it is occasionally seen in the early years of life in children of arthritic families. Heredity plays a predominating rôle. Almost all obese children have some corpulent persons among their ascendants on either the paternal or the maternal side, and sometimes on both. The heredity is almost always similar (an obese child of one or two obese parents), but it may be dissimilar, and thus polysarcia may occur in the children of individuals with gout, diabetes, or some other clinical expression of arthritism.

If to the hereditary predisposition, which acts so powerfully as a perverter or slower of metabolism, there are added a faulty alimentation, as over-indulgence in starchy, saccharine, or fatty foods, a sedentary life, an insufficient supply of fresh air, we shall have all the necessary factors for the production of obesity. During infancy, among nurslings, we may see overfeeding of itself give rise to obesity which is usually, however, temporary; the condition is seen especially in infants who are artificially fed, and in older children who are stuffed with too nutritious food.

Scrofula causes obesity in some cases, but diabetes, on the other hand, is never accompanied by polysarcia in children; such patients are always thin, and Sénac states that the children who were brought to Vichy for treatment for obesity were never diabetic. In the adult, on the other hand, diabetes is frequently associated with obesity.

Symptoms and Course.

Obese children are gross and deformed; the excess of fat stuffs them out and makes them sluggish, and by levelling the natural depressions and prominences it takes away from the face all expression and renders the appearance of the children ridiculous. The face is full and rounded, the chin rests on a puffiness in the suprahyoid region, the belly and the buttocks form exaggerated prominences, the waist grows short and large, and the body has lost all its grace and harmony.

When the child walks he separates his legs in a most ungraceful fashion, and advances with a waddling gait; if he tries to run he is soon obliged to stop because of excessive sweating, shortness of

breath, and palpitation of the heart. Even if he has preserved his usual spirits he is nevertheless apathetic and lazy, refusing to take physical exercise as well as to engage in mental occupation; his hours of sleep are too long and his food is excessive in amount.

Prognosis.

Obesity in the child is not so fatally progressive as it is in the adult, and it may become arrested, recede, or even be entirely recovered from at puberty.

Life is not immediately threatened, but it has been remarked that the obese have feeble powers of resistance to the various infectious diseases which may attack them, and that injuries in them are apt to be complicated by erysipelas, gangrene, etc.

The prognosis of obesity is also serious in the sense that it denotes a morbid temperament which has existed in the family for one, two, or several generations, and which is consequently in its essence incurable; the obesity may be cured but the malady is proteiform, and there will appear later, either in the patient himself or in his descendants, asthma, gout, diabetes, or some other of the arthritic affections. All this darkens the ultimate prognosis of obesity, and Hippocrates himself remarked upon the fact that the obese die young.

Prophylaxis and Treatment.

There are two indications to meet, viz.: (1) to prevent the formation of fat, and (2) to favor the disappearance of that already formed. The attempt has been made to effect this twofold result by putting the patient through a course of training, by prescribing violent exercises, giving purgatives and resolvents, such as iodine or iodide of potassium, by abstracting from the diet all saccharine, starchy, and alcoholic articles, etc. But we must avoid excess in this systematic therapy. The exercise should be daily, but moderate in amount; we should advise open-air games, bicycling, walking, and horseback riding, but not carried to the point of fatigue so as to cause immoderate sweating and consequent thirst. Ebstein cuts off starchy food, sugar, milk, and pastry, and reduces the amount of bread to 100 gm. (℥ iij.) of toast daily. His dietary is not very severe, but it is efficacious. Graham bread or whole-wheat bread appears to me to be indicated by reason of its nutritive value and its laxative properties. Three meals a day should be taken as follows: 1. Breakfast (at seven or eight o'clock), consisting of a slice of buttered toast and coffee without sugar. 2. Luncheon (at noon), of roast, boiled, or stewed meat, fresh vegetables, salad, cheese. 3. Dinner (at seven o'clock),

consisting of a slice of toast with cold meat. As drink we may allow 500 gm. (one pint) per day of white wine diluted with three parts of water. This régime is slowly curative, but it does not debilitate the patient and is free from danger. It may be prescribed as a prophylactic measure. Of Continental spas adapted to the treatment of obesity we may mention Marienbad, Brides in Savoy, and Châtel-Guyon in Auvergne.

Asthma.

This affection, a neurosis of the respiratory passages with catarrh, occurs in childhood and even in infancy.

Etiology.

True asthmatic attacks may make their appearance in very young children, two, three, five, or six months of age, having an arthritic heredity, in whose direct ancestry there is a history of asthma, gout, diabetes, etc. A gouty father may have an asthmatic child and this child may himself, after having had asthma, present symptoms of the gouty attack. Trousseau saw a child who at the age of five years had attacks of asthma, and at the age of seven had a well-marked gouty paroxysm.

Asthma is more rare in girls than in boys, differing in this respect from migraine, which shows a marked predilection for the female sex.

Heredity dominates the etiology of true, essential asthma. But alongside this diathetic, hereditary, arthritic asthma there have been described various symptomatic forms, such as hay fever (caused by the pollen of certain grasses), nasal asthma (dependent upon the presence of rhinitis or nasal polypi), pharyngeal asthma (from adenoid tumors or enlarged tonsils), ganglionic asthma (in mediastinal adenopathies), gastric or dyspeptic asthma, etc. When we are in the presence of an asthmatic child, therefore, we should not fail to make a careful examination of the nose, throat, digestive tract, etc., in order to eliminate the possibility of reflex asthma dependent upon a lesion of one of these organs.

The exciting causes of an asthmatic attack are the emotions, fatigue, cold, indigestion, strong odors, and atmospheric dust. The paroxysms are ordinarily more frequent in summer than in winter.

Symptoms.

Sometimes, before having true attacks of asthma, the children will have been subject to spasmodic coryza with repeated sneezing excited by a change in the atmospheric temperature or by bright sunlight.

Others have repeated attacks of nosebleed which is a sign of the morbid predisposition.

Many are suddenly and violently seized in the night or morning with extreme oppression accompanied by sibilant râles, audible at a distance, prostration, and cyanosis, and asphyxia seems imminent. Upon auscultation of the chest musical sounds are heard, sonorous and sibilant râles, disseminated throughout the lungs. The alæ nasi move rapidly, the respirations are 50 or 60 per minute, the pulse is 150 or over; the temperature is never very high, yet is always somewhat above the normal, 38° to 38.5° C. (100.4° to 101.3° F.). When these symptoms are observed for the first time in a young child, the physician very often regards the case as one of capillary bronchitis, and is naturally greatly alarmed; but in the course of twenty-four to forty-eight hours the scene changes and the child is found to be perfectly well.

These attacks, of variable severity in individual cases, recur once a month or every two months, spontaneously or in consequence of a cold. The cough is dry, short, and hard; it is accompanied sometimes by vomiting, and in the vomited matters may be seen more or less glairy mucus. The child comes out of one of these attacks pale and weak, but he soon recovers completely.

If eczema of the face is present, we may often see a sort of balance established, the asthma redoubling in intensity when the dermatosis improves, and inversely.

The hope may be entertained that infantile asthma may gradually diminish and finally disappear, but the rule is for it to persist and to cause finally vaulting of the thorax, pulmonary emphysema, and dilatation of the heart.

Diagnosis.

The younger the child the more difficult will be the diagnosis, and especially if it is the first attack and all the symptoms of capillary bronchitis seem to be present; but it may be differentiated from the latter by the suddenness of the attack, the rapid progress, the absence of localized pulmonary signs, the slight elevation of temperature, and the hereditary antecedents. Even if one should be deceived in the first attack, one can hardly be taken in by the second.

In the case of dyspeptic children with large belly and gastrectasia, who suffer from intermittent or remittent dyspnœa, we should think of dyspeptic asthma and direct our treatment accordingly (emetics and purgatives).

Tracheobronchial adenopathy sometimes gives rise to asthmatic

paroxysms, the true cause of which can often be discovered only after diligent search.

We know that malaria may sometimes be manifested by asthmatic attacks, and when, therefore, in a malarious country, we see these attacks occurring with regular periodicity we should not hesitate to resort to quinine.

Treatment.

We have to treat the disease and also the attacks. In the treatment of the disease itself we have to place our chief reliance upon iodide of potassium, given in doses of 5 cgm. (gr. $\frac{3}{4}$) for each year of the child's age, and continued during one month in every three. If there are articular manifestations we should give bicarbonate of sodium in doses of 10 cgm. (gr. iss.) for each year of the child's age during fifteen days of every month. If malaria is the cause of the trouble quinine must be given in doses of 10 cgm. for each year of the age during every other week.

During the summer, in addition to this general treatment, the children may be taken to some one of the thermal springs of the nature of La Bourboule or Mont-Dore, after they have reached the age of four or five years. Asthmatic children should never be taken to the seashore.

The local treatment of any nasopharyngeal lesions which may be present is of course indicated.

During the attack we may endeavor to attenuate and shorten the paroxysms by the administration of ipecac, 0.5–1 gm. (gr. viij.–xv.), antipyrin, 0.5 gm. (gr. viij.), belladonna, fumigations with nitre paper, cigarettes of stramonium, inhalations of oxygen, of iodide of ethyl, of pyridine, and especially by hypodermic injections of morphine in the dose of 1 mgm. (gr. $\frac{1}{60}$) for each year of the child's age.

For the treatment of the disease we must rely chiefly upon iodide of potassium, for that of the paroxysm upon opium (cautiously).

Migraine.

Migraine is characterized by a paroxysmal hemicephalalgia, returning at longer or shorter intervals and accompanied usually by nausea, vomiting, and photophobia.

Etiology.

True migraine does not belong to infancy, although its absence during the early years of life may be only apparent, the little patients not knowing how to translate the almost exclusively subjective phe-

nomena of this neurosis. I have seen a little girl who had her first attack at the age of two years. Girls are more often attacked than boys. Heredity plays the chief rôle in the etiology of migraine, the migraine of the children coming from that of the parents (similar heredity), or being a different manifestation of other forms of arthritism (dissimilar heredity).

Migraine belongs to both the nervous and the arthritic branch of the common neuroarthritic stock, and that is why it is described sometimes with the neuroses and sometimes with the dyscrasias.

An asthmatic and arthritic mother once brought to me her child of eight years who was suffering at the same time from asthmatic paroxysms and from attacks of uric-acid gravel. This combination of different affections in the same person and their similar or dissimilar hereditary transmission indicate clearly their common origin and justify the French conception of arthritism.

Migraine, like asthma, is sometimes distinctly referable to the presence of lesions in the nose or throat (rhinitis, polypi, adenoids).

Migraine is frequent in schoolchildren of both sexes, and Henoch regards as causes a sedentary life, confinement, and mental overwork acting during the period of growth in predisposed subjects.

Diseases of the stomach, gastrectasia, dyspepsia, and an excessive consumption of fluids, sometimes excite migrainous or migrainoid attacks, even when they do not act as exciting causes of true migraine. Disturbances of vision, such as accommodative asthenopia, may also be accompanied by migrainoid cephalalgia.

Symptoms.

The migraine of children is less often and less distinctly hemicranial than is that of adults. The pain is located in the frontal region; it comes on suddenly in consequence of fatigue, of some little outburst of anger, or of indigestion; the face is pale, the child is frowning, light is distressing (photophobia), and later appear nausea and vomiting, which are followed by relief.

As long as the patient struggles against the malady, keeps erect, and engages in some serious occupation the distressing symptoms increase; if, on the other hand, he lies down in a dark room and in silence, he becomes better. Sometimes the ocular troubles are the most prominent, the orbital pain is very marked, there are flashes of light or bright colors passing before the eyes; this is known as ophthalmic migraine.

In some very nervous children the attack is accompanied by delirium or by temporary aphasia.

The attack is usually of short duration, lasting from twelve to twenty-four or thirty-six hours; and it is generally shorter and less severe in children than in adults. In very young children the attack is manifested by crying and agitation, and is sometimes succeeded by unusual and prolonged somnolence. Except during the attack the child appears to be well.

There is no regularity in the return of the paroxysms. Some children have an attack every month, every fortnight, or every week; others have only four or five attacks a year without any regular periodicity.

In girls at the period of puberty we often see the paroxysms coincide with the menstrual epoch. Others cease to be troubled when menstruation is established. As age advances migraine usually becomes less severe, and it often disappears in women at the menopause.

The *prognosis* is not grave, for migraine is never fatal.

Diagnosis.

The diagnosis of migraine in children is difficult, for we have to eliminate a number of migrainoid states caused either by a bad condition of digestion (gluttonous headache or that of those who drink excessively), by confinement in over-heated and badly ventilated rooms (small living-rooms, workshops, or schools), by overwork at school, by defective accommodation, or by diseases of the nose, throat, or ears.

In order to admit of a diagnosis of migraine we must determine a periodicity in the attacks, a sudden onset, a short duration, an accompaniment of nausea and vomiting, a sudden cessation, hereditary relations, etc.

The headache of growth is not paroxysmal, the child suffers whenever he works or engages in intellectual effort, and the pain is relieved by repose. Anæmic, cerebral, or meningitic headache is recognized by the presence of other symptoms characteristic of these diseases. Facial neuralgia, which is rare in childhood, may be diagnosed by the presence of painful points where the nerves emerge from the skull.

In malarial countries we must exclude malarial headaches.

Treatment.

The child must be put to bed in a dark room, away from all noise, and must be allowed to eat nothing, but may have a little weak tea or cold drinks.

To moderate the violence of the attacks we may administer antipyrin in small doses every fifteen minutes until relief is obtained, not exceeding, however, 3 gm. (gr. xlv.) a day for a child of ten to fifteen years. Quinine may be tried in doses of 0.5–1 gm. Sometimes it is well to combine exalgine and caffeine with the antipyrin, 0.2 gm. (gr. iij.) of each in a powder.

During the intervals of the attacks we should advise exercise in the open air, cold douches, dry friction of the skin, and a life in the country. If the child is nervous we may give bromides; if he is anæmic, iron; if he is arthritic, alkalies.

Diabetes Mellitus.

Diabetes mellitus is characterized by the permanent presence in the urine of sugar; persistent glycosuria, the chief expression of diabetes, is more rare in childhood than at any other time, yet it is a well-recognized condition even then.

Etiology.

Diabetes may occur even in nursing children, during the earliest months of life, but it is more especially in later childhood, at eight, ten, or twelve years, that it is found with relative frequency. According to most of the statistics girls are more often affected than boys; Stern found from a study of one hundred and seventeen cases that of those attacked the proportion was five girls to three boys.

In diabetes, as in other arthritic diseases, heredity is very manifest as an etiological factor. If we look into the hereditary antecedents, direct or collateral, of young diabetics, we find, with a most convincing frequency, either diabetes, gout, obesity, asthma, or some other diathetic malady related to one of the preceding. However, we should add that direct and similar heredity (a diabetic father or mother) is found less often in children than in adults.

The exciting causes are: dietary indiscretions (excessive ingestion of starches and sugars), injuries to the head, tumors of the brain, epilepsy and other neuroses, infectious diseases, etc. I have seen a boy, fourteen years old, a great consumer of sugar, in whom diabetes appeared suddenly after an outburst of violent anger and a slight traumatism (wound of the hand from the breaking of a glass).

The *prognosis* is bad. Sometimes, in very nervous children, diabetes mellitus may end in death in less than seven months from its onset.

Pathological Anatomy.

The lesions of the nervous system, as well as those of the viscera, are inconstant and often of no pathological value. Different observers have noted anæmia of the brain, a punctate appearance of the cortex and centrum ovale, and superficial congestion. Of special importance are ecchymoses of the floor of the fourth ventricle (Pavy), or tumors of this region.

There is little of any importance to be noted in the lungs; tuberculosis is more rare in the diabetic child than in the adult suffering from this affection. The condition of the pancreas has not always been noted by observers, and it is possible that it may be diseased in a large number of cases (the pancreatic diabetes of Lancereaux). The liver is sometimes enlarged and fatty. The kidneys are congested and enlarged.

Prévost and Binet found in the cerebrospinal fluid and cerebral tissue a volatile body having a marked odor, acetone or aldehyde, in a girl of six and a half years who had died in diabetic coma.[1]

Symptoms.

In the larger number of cases diabetes is more easily recognized at its onset in children than in adults. The disease, far from being insidious, often announces itself unmistakably by excessive polyuria with polydipsia, the quantity of urine excreted in the twenty-four hours rising to four, five, or six litres (quarts). The child, who up to this time may have been normal in that respect, may have nocturnal or even diurnal incontinence of urine. The urine is clear, but often leaves on the clothing white spots looking like spots of candle grease. The specific gravity of the fluid is increased, rising to 1.030 or 1.040 when the glycosuria and azoturia are both very marked. In a case of a young child whom I saw some years ago the amount of sugar excreted in the twenty-four hours was from 300 to 350 gm. (4,500 to 5,250 gr.); the urea did not exceed 20 gm. (300 gr.), but this figure, which is considerable for a child, may even be surpassed. Albuminuria is rare in the diabetes of children, a circumstance which is due, no doubt, to the suppleness of their arteries and the integrity of their kidneys.

The polydipsia and polyphagia are very marked in most cases at the beginning and during the height of the affection, but they decline as the disease progresses.

The general condition speedily becomes alarming; the child is emaciated, without energy, and forceless; the tongue is dry, and the

thirst is imperative; the gums are swollen, the teeth decay, and the saliva is acid; obstinate constipation is present. The skin is always rough and dry (xerodermia), but it is not otherwise altered; it is not ulcerated and is not the seat of boils, carbuncles, and abscesses, such as we see in adult diabetics. Occasionally, however, vulvitis or balanitis has been observed.

The temperature of the interior of the body is lowered. The tendon reflexes are diminished or abolished. The child is apathetic or irritable, the sight is disturbed and sometimes lost (cataract).

The diabetes of children progresses rapidly, it is an acute diabetes. The little patients melt away before our eyes, it is a *diabète maigre;* the subcutaneous fat disappears, the muscles diminish in volume, there is a veritable autophagia, and soon the skin becomes too large for the body which it covers.

Prognosis.

Diabetes in children is always a very grave affection, and death does not have to be waited for long. At the end of a few months in the acute cases, or of two or three years in the chronic ones, a fatal termination ensues either in consequence of the continued emaciation and loss of strength, as a result of some bronchopulmonary complication, or by acetonuria and coma. In a third of the cases the duration is less than three months; in half of the cases it does not exceed six months; but in children over ten years of age it may last two years or even more. A few rare cases of recovery have been reported, but we can never count upon such a termination.

Sénac,[2] who acquired a very large experience with diabetes at Vichy, said that every diabetic child is destined to die within a brief period, and it is rare that we can effect even a temporary amelioration. The extreme gravity of diabetes mellitus in children is one of the best established facts of clinical experience, and its gravity varies inversely as the age of the child.

Diagnosis.

In order to arrive at a diagnosis of diabetes we must think of it, and we are the more likely to think of it in children as in them the characteristic symptoms, polyuria and polydipsia, are rarely absent. The first suspicion will lead us to analyze the urine, and then the diagnosis will be established. If we have to do with a nursing infant the difficulty of collecting the urine will present an obstacle, but it is an obstacle that can be overcome, for all that is necessary is to wring out the diaper as soon as it is wet and treat the fluid so obtained with

Fehling's solution. An analysis of the urine is indispensable in all cases, for it alone enables us to differentiate diabetes mellitus from diabetes insipidus or essential polyuria.

Once we have determined the presence of glycosuria, the diagnosis is established, but repeated examinations of the urine are necessary in order to appreciate the fluctuations in the quantity of sugar and the results of our therapeutic measures. They will also enable us to differentiate accidental or ephemeral glycosuria from the persistent and diathetic form.

Prophylaxis and Treatment.

A special diet is necessary for diabetic children as it is for adults affected with the same malady. Children at the breast naturally cannot be deprived of milk, but it must be forbidden to those who have been weaned; for drink these latter should take white or red wine diluted with three parts of pure or mineral water (Vichy, Bourboule, etc.).

All farinaceous and starchy foods, sugar, cakes, and saccharine fruits are to be forbidden. Ordinary bread must be taken in very small amount or is better replaced by gluten bread or aleuronat. Among the articles that may be allowed are eggs, meat, fats, green vegetables, fish, etc. Cod-liver oil is to be recommended if the child can digest it. Saccharine fruits, such as grapes, oranges, cherries, figs, plums, and strawberries, are to be excluded. Oily fruits, such as olives, and nuts, such as walnuts, almonds, pistachio nuts, may be permitted.

Among medicinal substances good results have been obtained in arthritic and nervous children by the use of bromide of potassium, 1–2 gm. (gr. xv.–xxx.) a day, arsenic 0.004–0.005 gm. (gr. $\frac{1}{15}$–$\frac{1}{12}$), antipyrin, 1–3 gm. (gr. xv.–xlv.), bicarbonate of sodium, 2–4 gm. (gr. xxx.–lx.), extract of belladonna, opium, iron, and quinine. The best mineral waters to prescribe are those of Vichy, Vals, and La Bourboule.

All these measures, however, only suffice to postpone the fatal termination, they are merely palliative, and never curative. Can we hope that the day will come when organotherapy will give us more efficacious remedies against diabetes? The pathogenic rôle attributed to the pancreas has led to some tentatives in this direction. I have myself injected a glycerin extract of sheep's pancreas in the case of a young sufferer from diabetes, but without any success. The administration of pieces of pancreas by the mouth might perhaps give better results than the subcutaneous injection of an extract.

DISEASES OF THE BLOOD.

Chlorosis.

Chlorosis, *morbus virgineus*, is a form of anæmia peculiar to the female sex, appearing about puberty, before, during, or after the establishment of the menses.

Etiology.

Chlorosis is especially a disease of city dwellers; it exists in the country, but is very rare there. We often see it attack young girls who have left the fields to work in factories or shops or in domestic service. The sedentary life, fatigue, unventilated apartments, excesses of all kinds, homesickness, disappointments, and privations all help contribute to the establishment of chlorosis in girls who are predisposed to this affection.

The predisposition to chlorosis may be hereditary or acquired; the parents of chlorotic girls are often arthritic, nervous, or tuberculous. Chlorosis is not always a disease of misery, for we may see it among the most favored of fortune. Young girls in society, who go to evening entertainments, such as balls and the theatre, whose nerves and senses are put upon the stretch by pleasure and artistic excitations, easily become chlorotic as they approach womanhood. In the rich city girl, as in the poor work girl, it is a defective hygiene which gives the impulse to chlorotic anæmia.

It has been thought by some that chlorosis was related to pulmonary tuberculosis, and clinical statistics have been laboriously collected which show, on the one hand, that chlorotic girls are frequently encountered in the families of the tuberculous, and on the other hand, that they themselves often end by becoming tuberculous. But in these statistics there has been a confusion of true chlorosis with false chlorosis—chlorotuberculosis. Chlorosis is generally independent of tuberculosis; it is especially allied to arthritism or to neuropathy, and deserves the name of chloroneurosis.

Potain regards heredity as a factor in the etiology of chlorosis, chlorotic girls often having mothers who were chlorotic in early life. Hayem, who only once out of twenty-one cases saw chlorosis in both mother and daughter, does not believe in the influence of heredity. Similar heredity is without doubt rare, but dissimilar heredity is the rule, chlorotic girls coming from a nervous or arthritic stock, and we often find in the parents hysteria, gout, diabetes, gravel, asthma, or migraine.

Virchow regarded a congenital stenosis of the aorta or a general narrowing of all the arteries as a proximate cause of chlorosis. It is possible that a post-mortem examination, in the rare cases in which this has been possible, may have shown the existence of this arterial narrowing; but if the "chlorotic aorta" were always the underlying anatomical cause, it would be difficult to comprehend the rather short duration of the malady and its absolute curability. Here is a young girl of fourteen, fifteen, or sixteen years, profoundly anæmic; two or three years later she has become a woman, beautiful, full blooded, vigorous, and apparently possessed of perfectly normal arteries. If arterial stenosis were the true cause of the chloroanæmic state, we could not explain why the affection is limited to the female sex, and why it is capable of radical cure without leaving behind an incomplete physical development.

Duclos, of Tours, and Sir Andrew Clark, of London, located the cause of chlorosis in the intestine, believing that the constipation, which is the rule in chlorotics, is a source of autointoxication producing an impoverishment of the blood. Forchheimer, of Cincinnati, seems to be inspired with this pathogenesis when he proposes to treat the anæmia by intestinal antiseptics; according to him the origin of the hæmoglobin is in the intestine, and it is to this part of the economy that we must address ourselves in order to effect an increase in the formation or a decrease in the destruction of hæmoglobin. Bouchard, having noted that the stomach is dilated in the majority of chlorotic patients, attributes a pathogenic rôle to gastrectasia. Finally Clement, of Lyons, urges the infectious nature of chlorosis, basing his belief on the fact that he found enlargement of the spleen in all the chlorotic girls whom he examined.

The very fact of the existence of theories so opposed to each other proves that we are far from being settled as to the nature of chlorosis.

Pathological Anatomy.

The principal known anatomical lesion is that of the blood, and the examination of this fluid long since led to the classification of the disease among the anæmias. The researches of Hoppe-Seyler, Hayem, Malassez, and Henocque have shown that the blood of chlorotic girls is pale and that this decoloration is due less to a diminution in the number of the red blood corpuscles than to the destruction of the coloring matter of the blood, the hæmoglobin. There is no doubt that the red blood corpuscles may be diminished in number, from five million down sometimes to even two million per cubic millimetre. But the enumeration of the red blood corpuscles does not

enable us to judge of the degree of the chlorosis. One patient may have an almost normal proportion of red blood corpuscles without being less anæmic than another in whom the hypoglobulia is very considerable. In all the patients we may satisfy ourselves of a diminution of hæmoglobin by means of the spectroscopic examination proposed by Hoppe-Seyler; instead of amounting to thirteen or fourteen per cent., it will be found to have fallen to five or six per cent.

The red corpuscle has no value except for the hæmoglobin which it contains. As early as 1867 J. Duncan found in the case of three chlorotic patients that the red corpuscles were almost as numerous as in the normal state, while their coloration had diminished by two-thirds. At the same time that the red corpuscles grow pale they increase in volume. The greenish hue of some chlorotic girls is due to the greater dilution of the hæmoglobin, for weak solutions of hæmoglobin permit the green rays of the spectrum to pass through. It is the hæmoglobin which contains the iron of the blood and it is that which absorbs oxygen; the blood has no value in a respiratory sense except for the hæmoglobin which it contains.

Hayem found that in chlorotics the hæmatoblasts were transformed into imperfect red corpuscles, that these corpuscles were prematurely destroyed, and that this deglobulization caused the passage into the urine of hæmatin and of urobilin. He held that this disposition of the hæmatoblasts to give origin to imperfect red corpuscles and that of the latter to early destruction were the dominating factors in chlorosis, explaining the symptomatology and offering an indication for treatment.

Symptoms.

The beginning of chlorosis is slow and insidious, and it is only by degrees that the patients acquire the characteristic yellowish-green facies. The face is pale, but the pallor is not uniform as in other anæmias; it has a special tint which the word of Greek origin, chlorosis, is intended to express. This tint is not general, but is found especially on the forehead, round the eyes, and in the natural folds of the skin, while the cheeks are often pink; in some girls this color of the cheeks is so high as perhaps to lead to error and the exclusion of a diagnosis of anæmia—chlorosis fortiorum. The pallor is not limited to the face but extends over the entire surface of the body, which is white, dull, and anæmic. The hands are yellow, the nails colorless, and the extremities cold. All the visible mucous membranes, the lips, the gums, the conjunctivæ, are exsanguine as if their vessels contained only a thin and decolorized blood.

The body does not emaciate, and there may even be an increase in fat despite the anorexia and indigestion—chlorotic polysarcia. The patients complain of getting out of breath, of palpitations, and of pains in the head, stomach, and chest walls. When standing they have vertigo, dimness of vision, and ringing in the ears, due to the cerebral anæmia. The nervous system appears to be greatly disturbed, the general sensibility is diminished or abolished, the pharyngeal reflex is weakened or absent. Peculiarities of character are noticed, such as iritability and nervous crises.

On the side of the digestive organs also the disorders are no less marked; we note anorexia, irregular and capricious appetite, pica and malacia, great thirst, slow and painful digestion, meteorism, gastralgia, and constipation.

The menses, if they have already made their appearance, are uncertain, sometimes slight in amount, the blood is pale in color, and leucorrhœa persists in the intervals between the menstrual epochs. Sometimes there is absolute amenorrhœa. If menstruation has not yet appeared it will be late and will be established with difficulty—dysmenorrhœa.

On the side of the circulatory apparatus and the heart, the symptoms are characteristic, a frequent but regular pulse, a systolic murmur at the base at the level of the second intercostal space near the left border of the sternum; this murmur, which Constantin Paul located in the pulmonary artery, is formed without doubt in the aorta, for it is propagated into the carotid arteries. A stethoscope placed between the two lower divisions of the sternomastoid muscle will enable us to hear a continuous murmur with a periodical increase in intensity, which Bouillaud described under the name of *bruit de diable*. This murmur, often musical, sometimes imitates the buzzing of a fly or the chirping of a bird. Sometimes we hear a murmur at the apex of the heart. Peter has noted a reduplication of the second sound, a venous pulse when the patient is lying down, and also the possibility of murmurs at all the orifices of the heart due to spasmodic stenosis or atonic insufficiency.

How can we explain the murmurs at the base of the heart and in the vessels of the neck? Are they due to a narrowing of the arteries, to a diminution in the mass of the blood, or to a chemical alteration in the composition of this fluid? According to Peter, the quantity of blood is reduced, and the elastic aorta, accommodating itself to this lessened stream, gives rise to the systolic murmur at the base. But the diminution in the amount of the blood plasma is far from being an admissible fact; while there is hypoglobulia in chlorosis, there is at the same time hydræmia, an aqueous plethora. It is therefore

possible that a chemical change in the composition of the blood is concerned in the production of these murmurs.

Among the complications of chlorosis we have to note phlegmasia alba dolens, a true phlebitis due to secondary infection, that is to say, to an accidental cause.

Chlorosis is of long duration; the disease may pursue its course for months and even years with remissions and frequent relapses. Eventually it terminates in recovery.

Diagnosis.

The diagnosis is easy if we take into consideration the age (adolescence), the sex (girls), and the facies of the patients, the murmurs in the heart and great vessels, and the composition of the blood. We must be especially careful to differentiate between true chlorosis, the chloroneurosis, a disease of evolution, always curable, and false chlorosis which may mask a latent tuberculosis, chronic dyspepsia, or some organic disease. The diagnosis must be made by means of a careful examination of all the viscera, auscultating the lungs, palpating the abdomen, etc.

The *prognosis* in true chlorosis is favorable.

Treatment.

The treatment of chlorosis must be at once hygienic and medicinal. In very pronounced cases we should advise rest in bed, in a room with open windows. When the patient is able to be up she should live in the open air as much as possible, without however exercising to the point of fatigue. Mental rest should accompany the physical, reading and all intellectual pursuits being forbidden. As many hours as possible should be given to sleep.

The patient should be taken to the country, when this is possible. Places of moderate elevation (two thousand to three thousand feet) are sometimes beneficial. For lymphatic patients, not too nervous, we may try a sojourn at the seashore.

The diet should be regulated; dairy products, eggs, cream, vegetable purées, thick soups, cooked fruit, cooked meat, or raw meat in severe cases. Indigestible substances and highly spiced food should be forbidden. For drink the patients should take milk, never alcoholic beverages.

Stimulation of the skin by means of dry rubbing, douches, or salt or sulphur baths, will be of service. The inhalation of oxygen has been specially recommended.

The bowels must be carefully regulated by means of laxatives,

such as magnesia or rhubarb, combined with intestinal antiseptics (benzonaphthol), bitters (nux vomica), or alkalies (bicarbonate of sodium). Iron is a specific remedy for chlorosis; it may be given in the form of the protoxalate, 5, 10 or 15 cgm. (gr. $\frac{3}{4}$–$2\frac{1}{4}$), the peptonate, the perchloride, or the waters of Spa or of Orezza. When iron does not effect a cure we may give arsenic (Bourboule water).

For the digestion it may be well sometimes to prescribe hydrochloric acid, one to four drops in half a glass of sweetened water after meals.

Simple Anæmia.

Anæmia, characterized by pallor of the skin and mucous membranes, by languor, weakness, inertia of all the functions, and a precarious state of nutrition, is very common in children of all ages, and may arise from various causes.

Etiology.

A child may become anæmic at any age, and he becomes so very easily; he may even be born anæmic, when he comes from a tuberculous or syphilitic stock, and we have therefore to admit the existence of an intrauterine anæmia.

The nursing infant becomes anæmic when it is badly or insufficiently fed (artificial feeding, too abundant or too little food, or food of too coarse a character), when its digestion is poor, or when it suffers from some impoverishing or cachexia-producing malady, such as diarrhœa, malaria, syphilis, rachitis, tuberculosis, or scrofula.

Of all the causes of anæmia in infancy none is more active than diarrhœa, acute or chronic, infectious or lienteric. In cases of cholera infantum the number of the red blood corpuscles has been seen to fall rapidly to one million or even less per cubic millimetre.

Acute diseases, such as typhoid fever, grippe, the exanthemata, whooping-cough, and diphtheria, very frequently leave anæmia behind them. This anæmia, which is usually temporary only, may, in case of severe and prolonged acute disease, become lasting.

But the persistent forms of anæmia are caused especially by chronic maladies, such as pulmonary, osseous, or articular tuberculosis, prolonged suppuration, syphilis, chronic diarrhœa, dyspepsia, and Bright's disease. Tuberculosis at its inception often assumes the appearance of anæmia and dyspepsia. In very young children anæmia often coincides with bacillary polyadenopathy.

In later childhood anæmia may be caused by a defective hygiene, confinement to the house, school life, overcrowding, etc.

Pathological Anatomy.

The blood is always more or less altered in anæmia. The red corpuscles are reduced from the normal number of 5,000,000 per cubic millimetre to 4,000,000, 3,000,000, or even 2,000,000. The hæmoglobin is reduced by one-third, one-half, or at times even two-thirds, and the capacity for the absorption of oxygen is diminished in the same proportion. The white corpuscles present insignificant or no alterations in simple anæmia.

In very young children, nurslings, Hayem found notable inequalities in the diameter of the red corpuscles; the giant cells become very numerous, and the nucleated cells appear in considerable numbers; this is a return of the blood to the embryonic condition. Nucleated red corpuscles are not observed in the anæmia of adults except in very grave cases, but in children they may be found in mild cases.

Symptoms.

Anæmic children are of a very pale color, the pallor being sometimes limited to the skin, sometimes involving also the mucous membranes. The color of the integuments varies in different cases from a uniform dull pallor to a waxy and parchment appearance. In cases of hereditary syphilis, the face has an earthy bistre aspect which is characteristic of the malady. In athrepsia the pallor is accompanied by deep wrinkles which give a senile facies to the child.

Together with the pallor, anæmic children show a notable degree of emaciation with softness and flaccidity of the flesh. They show weakness, inertia, a difficulty in movement, in walking, running, or mounting stairs; they soon get out of breath, and suffer from palpitation. The digestion is poor, the appetite is diminished or entirely lost. Anæmic children complain often of the head and of obscure pains in the side or in the limbs.

Auscultation of the heart is sometimes negative, sometimes it gives positive results. If the anæmia is very profound we may hear a systolic murmur at the base, but not so constantly as in chlorosis. The murmur in the vessels of the neck, systolic, or continuous with pulsating increase in intensity, is the rule. The results of auscultation are, however, less constant and certain than in chlorosis.

Prognosis.

The course of the anæmia and its prognosis are dependent upon the course and the prognosis of the primary affection. If this is an acute disease, such as one of the exanthemata, the anæmia will be of

short duration; but if the child is suffering from a chronic affection of the digestive or respiratory organs, the anæmia will be equally chronic and will follow the evolution and the oscillations of the dyspepsia or the phthisis upon which it is dependent. In the case of hereditary syphilis a mercurial treatment will relieve the anæmia at the same time that it cures the specific malady.

In general, therefore, the anæmia in itself is not very grave, but we must base our prognosis upon its cause.

Diagnosis.

This rests upon the appearance of the patients and an examination of the blood; the anæmia is easily recognized, but we must bring to light the cause. The results of a pulmonary examination or the presence of hypertrophied lymphatic glands will enable us to determine whether tuberculosis is to be feared. Syphilis will be shown by the usual stigmata; chlorosis by the age, the sex, and the appearance of the patients; Bright's disease by an examination of the urine; anæmia of intestinal origin will have followed upon diarrhœa or indigestion; leukæmia is manifested by the presence of a large number of leucocytes in the blood; malaria may be suspected by the presence of an hypertrophied spleen, etc.

Treatment.

The general indications in the treatment of anæmia are to combat the cause (syphilis, malaria, rachitis, diarrhœa, tuberculosis, etc.) by appropriate remedies, to place the child under good hygienic conditions as regards lodging, fresh air, and food, and to rectify any errors in the diet.

If the cause of the anæmia is syphilis, the best treatment will be by mercury (inunction of Neapolitan ointment, sublimate baths) and iodide of potassium; if it is athrepsia, we must counsel breast feeding, an absolute milk diet; or in older children, in the case of rickets the indications are for sea baths and saline mineral waters; in scrofula we must prescribe cod-liver oil, arsenic, and syrup of the iodide of iron; in dyspepsia alkalies may be indicated, etc. In all cases we must use with great discretion iron, alcoholic liquors, or strong wines; better than these alleged tonics will be inhalations of oxygen, saline or sulphur baths, douches, and dry rubbing of the skin.

Progressive Pernicious Anæmia.

This affection, which was described by Biermer in 1868, is more rare in children than in adults. In some cases it has seemed to depend upon the presence of intestinal worms (ascaris, bothriocephalus,

ankylostoma duodenale). In Russia especially the coexistence of helminthiasis and pernicious anæmia has been remarked, and it has led some to conclude that helminthic anæmia and pernicious anæmia are identical.

Sometimes the cause has been found in hereditary syphilis, rachitis, or dyspepsia, but more commonly no cause can be found, and we are led to invoke the action of some infectious agent capable of destroying the red blood cells. A fact that gives some support to this theory is the presence of fever, which has very often been noted, especially at advanced periods of the malady.

Symptoms.

The children present a waxy pallor which contrasts with their relative *embonpoint*. They lose their appetite rapidly, become weak, suffer from dyspnœa, vertigo, and a tendency to syncope; the pulse is very rapid, and a systolic murmur may be heard at the base of the heart.

The cachexia is shown more and more by the œdema of the extremities, purpura, multiple hemorrhages (epistaxis, melæna, retinal ecchymoses), and gastrointestinal disturbances (diarrhœa, vomiting). Death is the usual termination unless the anæmia is due to the presence of intestinal worms, in which case the expulsion of the parasites will be followed by a cure.

The duration of the disease is rather short, being reckoned by weeks or months.

Pathological Anatomy.

An examination of the blood shows a considerable diminution of the red corpuscles, which may be reduced in number to 1,000,000 or even 500,000 per cubic millimetre. They are increased or diminished in size, often irregular in form, and nucleated red corpuscles are found. The white cells are also diminished in number, so that we find a general impoverishment of the blood in cellular elements. The color of the red corpuscles which remain is not altered, and according to Warner the percentage of hæmoglobin remains high, almost normal.

Consecutive to this rapid and extreme anæmia there are changes in the viscera; the liver and the heart are fatty degenerated, and cardiac insufficiency is added to the hepatic insufficiency to render the condition irremediable.

Treatment.

The indications are, in pernicious anæmia, to give the children arsenic (daily one drop of Fowler's solution for each year of the child's age); quinine when malaria is suspected (gr. iss. for each year of the age); iodide of potassium in case of syphilis (gr. iss. for each year of the child's age). Before beginning the general treatment we should give an anthelmintic, such as calomel in doses of gr. iij.–v., santonin gr. ¾ to 1½, or extract of male fern gr. lx. to xc.

Pseudoleukæmia.

Splenic anæmia or pseudoleukæmia has as its characteristic symptom a considerable enlargement of the spleen, and it frequently coexists with rachitis. It has been studied in Italy by L. Somma, F. Fede, and Cardarelli; in Germany by v. Jaksch; in France by Luzet and others. Hodgkin's disease is a special form in which there occur an anæmia without increase in the number of white corpuscles, engorgement of the lymphatic glands and of the spleen, and fever.

Splenic anæmia affects especially children in the first years of life, and is characterized by splenomegaly and a moderate leucocytosis. The proportion of the white to the red corpuscles varies from 1:150 to 1:200, and we find no such extreme figures as in leukæmia; but transitional cases have been described in which pseudoleukæmia passed into true leukæmia. The red corpuscles are reduced in number, falling to from 1,000,000 to 800,000 per cubic millimetre; they lose their coloring matter in part, the hæmoglobin being reduced one-half. The red cells are of very variable size, some being normal, some small, some pale, others deformed, etc. Finally we find the presence in the blood of nucleated red cells such as ordinarily exist only in the fœtus. This return of the blood to the fœtal condition has been well demonstrated by Hayem and Luzet.

The liver is slightly enlarged, but the spleen is enormous, extending to the umbilicus or even to Poupart's ligament. This hypertrophy may be simple or accompanied by lymphatic deposits in the Malpighian bodies and around the capillaries; these lymphomata have been seen by Audeoud.

Clinically we distinguish several forms, one apyretic, of slow progress, characterized solely by pallor of the skin, enlargement of the spleen, and hemorrhages; the other febrile, of a remittent or intermittent type. In the latter form we must consider the possibility

of malaria, which, in Italy especially, would appear to have often played an important pathogenic rôle.

The subcutaneous lymphatic glands are increased in volume in at least a third of the cases.

Treatment.—Splenic anæmia is less grave than pernicious anæmia, and is curable in the majority of cases by arsenic, quinine, or simply hygienic measures (breast-feeding, change of the surroundings, in older children nourishing food, etc.). Nevertheless pseudoleukæmia may terminate in true leukæmia. Combe, of Lausanne, has treated pseudoleukæmia successfully by bone-marrow from a calf. He mixes a tablespoonful of bone-marrow with three spoonfuls of water, filters the mixture, and gives it in milk; this dose is repeated daily.

Leukæmia.

Leukæmia or leucocythæmia, which is more rare in children than in adults, is distinguished from pernicious anæmia and splenic anæmia by hypertrophy of all the hæmatopoietic organs and by the deposit of lymphatic collections in these organs (spleen, liver, glands, closed follicles, bone marrow).

It is very rare in infancy, but is less uncommon after the age of four years. It is evidenced especially by an increase in size of the spleen and lymphatic glands, and the purely intestinal or myelogenic forms are exceptional. Cases have been reported of the deposit of lymphomata in the derma, thymus gland, lacrymal gland, etc. Tordeus and Dallemagne[a] treated a girl of three years who was leukæmic, and died suddenly after having presented a marked increase in the number of the white corpuscles—one white to three or four red cells. At the autopsy the lungs, liver, and spleen were studded with innumerable minute lymphomata looking like miliary tubercles; Peyer's patches and the closed follicles of the intestine were hypertrophied.

Examination of the blood shows a profound anæmia; the number of the red corpuscles is reduced to 1,000,000 or less per cubic millimetre, and the proportion between the red and white cells is characteristic; we no longer find one white cell to 150 or 200 red, as in pseudoleukæmia, but 1 to 20, to 10, or sometimes even 1 to 3, to 2, or to 1; the number of white cells has even been found to surpass that of the red. This exaggerated leucocytosis is a pathognomonic sign of leukæmia.

The red corpuscles are not only less numerous, but their shape is altered (giant cells, dwarf cells, or deformed cells), as is also their color; there is a diminution in the amount of hæmoglobin

and a corresponding falling off in the respiratory capacity of the blood.

The children are seen to be extremely anæmic; there is pallor with excessive asthenia, shortness of breath, tachycardia, and a tendency to hemorrhage; the hypertrophy of the lymphatic glands may exist alone and temporarily (Trousseau's adenia); the attacks of fever recur at longer or shorter intervals.

This malady follows a chronic course, and death may not take place until the end of two or three years. It is due to the cachexia when it is not hastened by some complication, such as hemorrhage, compression of the trachea by enlarged mediastinal glands, bronchopneumonia, pleurisy, etc.

The *prognosis* is exceedingly grave; nevertheless recovery has taken place in a small number of cases.

Treatment.—We must endeavor to tone up and strengthen the patients by hydrotherapy, iron, quinine, and cod-liver oil. Against the glandular hypertrophy we may employ Fowler's solution by interstitial injection or by the mouth.

Hæmophilia.

Hæmophilia, a familial disease characterized by a marked diminution in the coagulability of the blood, is an hereditary and constitutional predisposition to lose blood in great abundance without any appreciable cause or in consequence of a slight traumatism. This deplorable tendency to hemorrhages may show itself in the cradle, and it is especially in the very young that we may and ought to combat it.

Even in healthy infants the hæmophilic temperament exists in outline, for the slightest traumatisms, such as the bites of insects, are followed by the appearance of petechiæ and ecchymoses.

In addition to hereditary and diathetic hæmophilia, acquired or accidental forms of the affection have been described. Hayem has reported an instance in the case of an infant of two months whose gall-bladder had ruptured into the peritoneum.[4] Diseases of the biliary apparatus and liver predispose to hemorrhage.

Etiology.

Hæmophilia is more common in northern countries and in cold and damp climates than in temperate and warm regions. It is very rare in France, but occurs with relative frequency in Germany, Russia, and Norway. Among the thousands of children seen by me in Paris during the past sixteen years, I have observed but three cases of hæmophilia.

The hereditary influence is undeniable, whether all the children of the same family pay tribute to the malady or whether most of them escape. Boys are affected much more frequently than girls. But the female members of a family of bleeders, although they themselves escape, may transmit the tendency to their children. Thus hæmophilia may skip one generation. Certain races (Hebrews and Turks) are more liable to the malady than others. Children who are sufferers from hæmophilia are usually pale and of a lymphatic appearance.

Pathological Anatomy.

Examination of the blood shows nothing characteristic; its richness in red cells and its content of hæmoglobin are normal. Certain arterial lesions, to which a pathogenic rôle has been attributed, have been noted (Magnus Huss, Percy Kidd). The muscular coat of the arterioles is thinned, absent in places, and replaced here and there by collections of fatty matter, as in atheroma. The lumen of the capillaries is sometimes narrowed and obstructed by masses of desquamated or proliferated endothelial cells. These lesions, which are probably congenital, end in the obliteration of a sufficient number of vessels to account for the production of the hemorrhages.

Symptoms.

The characteristic symptom of hæmophilia is the tendency which the children have to bleed profusely and frequently from the mucous membranes (epistaxis), from an accidental wound, a scratch or an operative laceration, such as the extraction of a tooth. If epistaxis occurs we see the blood flow drop by drop or in a continuous jet indefinitely, even to the production of syncope; in some cases of this nature a simple plugging of the nostrils will suffice to put an end to the hemorrhage. If there is a cut the blood wells out of the wound, at first slowly and without any peculiarity which would cause alarm; but it does not stop, persisting for hours, a day, perhaps several days, until the child is literally exsanguine.

Death may thus result from a simple capillary hemorrhage, and bleeders usually die young, being always at the mercy of these sudden and uncontrollable losses of blood. Therefore before performing a surgical operation on a young child, we should acquaint ourselves with its antecedents so as to avoid cutting a bleeder.

The most frequent form of these hemorrhages is epistaxis, and next come in order bleeding from the mouth, from the intestine, the lungs, the kidneys, and the uterus. Spontaneous hemorrhages from the mucous membranes, nose-bleed for example, are announced by a

sensation of heat in the head, by ringing in the ears, vertigo, and dimness of sight.

In addition to external hemorrhages instances have been observed of ecchymoses, purpura, hemorrhagic infiltrations into the cellular tissue, the muscles, and under the periosteum. The patients complain also of articular pains coinciding with, preceding, or following effusions of blood into the joints. These pains, which are as mobile as those of rheumatism, affect especially the knees, which become enlarged, sensitive to pressure, covered with ecchymoses, and sometimes soft and fluctuating. There is no fever, however.

Prognosis.

Hæmophilia is a very disquieting morbid predisposition, for it is almost incurable; life is constantly threatened by the loss of blood; the complexion becomes pale, the flesh is soft, a cachectic condition gradually supervenes, and death may take place from a final hemorrhage. The prognosis is, however, not inevitably fatal, for some bleeders have been known to live to an advanced age.

Diagnosis.

The diagnosis of hæmophilia is easy when we are acquainted with the hereditary antecedents, and when we have the opportunity to observe one of these causeless and uncontrollable hemorrhages. It must be remembered that certain organic affections of the kidneys or of the liver (pernicious jaundice) may be accompanied by repeated hemorrhages. Purpura hæmorrhagica is to be distinguished from hæmophilia by its acute character, its independence of any hereditary cause, and its short duration. The same characters serve to distinguish the hemorrhagic eruptive fevers. In scurvy the gums are profoundly altered, and the causes are to be discovered on careful examination. Leukæmia may be recognized by an examination of the blood.

Treatment.

In the case of every bleeder one ought to postpone as long as possible the most trivial surgical procedure, such as the extraction of a tooth, the opening of an abscess, or circumcision. If intervention becomes urgent, the bistoury shall be replaced by the thermocautery or the galvanocautery which may enable us to operate without causing blood to flow. All possible care must be taken to preserve these children from injuries of all kinds which might open the way to a hemorrhage.

If the hemorrhage has begun we must combat it by energetic and prolonged compression, such as plugging of the nostrils, the application of an Esmarch bandage, or forcipressure. When the bleeding surfaces are accessible they may be covered with punk, antipyrin, or cocaine compresses. Internally we may give ergotin by the mouth or hypodermically.

We must not forget the use of tonics and reconstituents, such as iron, cinchona, and arsenic (Fowler's solution). Change of air and climate is to be advised, the sunny regions of the South being preferable to the fogs of the North.

Purpura Hæmorrhagica.

A Hanoverian physician of the last century, Werlhof, described a special disease characterized by two symptoms, petechiæ or cutaneous hemorrhages and bleeding from the mucous membranes. The morbus maculosus Werlhofii was generally benign. To-day the question has become more complex, for around this type of Werlhof's disease gravitate numerous cases of purpura, some mild, others grave, which sometimes appear to be of a nervous or dyscrasic order, and sometimes present the marks of infectious diseases.

Etiology.

Purpura hæmorrhagica is especially a disease of later childhood and adolescence, and is as rare in adults as it is in the new-born; the usual age at which it is observed is between six and fifteen years. The cause of the malady often escapes us, and we do not see that weak, puny, exhausted, or constitutionally feeble children are more liable to suffer than are the robust. Possibly on careful search we might find in some cases evidences of hæmophilia, but this is certainly not the rule in all cases. It has been said that Werlhof's disease is more frequent in Russia and in cold countries than in the rest of Europe.

Powerful emotions, falls, or traumatism may precede the appearance of the hemorrhages. Contagion is far from being established as a factor in the causation of the disease, for we never see either in the family or in hospital wards the transmission of the disease from one child to another, and this in spite of the entire absence of any attempt at isolation. Relapse is possible, though it has rarely been observed.

Alongside of this relatively benign form we see more severe cases, actually infectious, not only in the new-born but in older children as well. Hanot and Luzet have reported the case of a pregnant woman suffering from streptococcal meningitis, whose child was attacked in

utero with purpura in which the same microbe was found.[5] In the same class with streptococcal purpura we must place pneumococcal purpura (Claisse[6]) and purpura caused by the staphylococcus aureus (Haushalter). In many cases of grave purpura in children Martin de Gimard[7] found micrococci in the blood which he regarded as the pathogenic agents of the disease. In Italy, G. Somma has observed, in nursing infants, an ecchymotic purpura with large patches which he attributed to an infection of gastrointestinal origin.[8] The fulminant purpura of Henoch and the pernicious purpura of Rinonapoli resemble these infectious forms by the suddenness of their onset, the rapidity of their progress, and the gravity of their termination. Purpura is frequent in various cachexias, such as tuberculosis, syphilis, scurvy, diseases of the heart and kidneys, etc. It is a symptom common to many other morbid states, such as rheumatism, diseases of the spinal cord, etc. Purpura is called rheumatismal when it accompanies arthralgia (peliosis rheumatica); it is called simple when it occurs alone.

We do not speak here of the hemorrhagic affection of the newborn, which will be described later in the section on melæna.

Symptoms.

Sometimes fever is absent and the purpura is the only symptom (purpura simplex); at other times it dominates the other manifestations, being intense, continuous, and accompanied by prostration (typhoid purpura); at other times again the articular symptoms are marked (purpura rheumatica).

The onset may be marked by the appearance of petechiæ, sanguineous patches of the skin, or by a general malaise, anorexia, a sense of fatigue and fever.

The red spots are disseminated, of variable number, and situated on the trunk and limbs, sparing ordinarily the neck and face. Some are small and punctiform, others are large, rounded in outline, pea-shaped, or lenticular. They are at first of a lively red color, which does not disappear under pressure of the finger, but later become paler, and gradually in the course of a few days become of a greenish-yellow color. Between the petechiæ the folds of the skin may appear as ecchymotic lines.

The superficial hemorrhages may be accompanied by deep hemorrhages, under the skin, in the muscles, in the viscera, or in the brain. It is to the occurrence of hemorrhages in the nerve centres that we must attribute the convulsions, coma, paralysis, contractures, or epileptiform attacks observed in certain cases.

The course of Werlhof's disease is by successive outbreaks, each marked by fever and general symptoms. The fever is generally moderate, not passing beyond 38° to 38.5° (100.4° to 101.2° F.), although sometimes it rises to 40° or 41° (104°–105.8° F.) in the infectious cases. In these hyperthermic forms of purpura the child is prostrated and adynamic, the tongue is dry, the teeth are covered with sordes, and the typhoid state is very pronounced. In peliosis rheumatica we see, in addition to the joint symptoms, patches of subcutaneous œdema and of diffuse erythema alternating or coinciding with the petechiæ.

Hemorrhages from the mucous membranes are frequent. The gums bleed and the child suffers from repeated and profuse epistaxis, and there may be melæna, hæmaturia, hæmatemesis, or hæmoptysis. These losses of blood, when they are abundant, reduce the patients rapidly, expose them to death from syncope, and in any case prevent or retard convalescence. In two cases of purpura accompanied by joint symptoms Martin de Gimard saw gangrene complicating the petechiæ, and one of the cases terminated fatally.

Hemorrhagic purpura has a short duration, varying from one to three or four weeks according as there may have been one or several successive crops of the eruption.

Prognosis.

The affection is usually benign, but the prognosis may become grave in some cases, and it should always be reserved at the beginning. In tuberculous children purpura is stated to be very grave, and Kissel, of Moscow, has seen two cases of Werlhof's disease complicating tuberculosis which terminated fatally.

Diagnosis.

In order to arrive at an intelligent prognosis we must first endeavor to distinguish the different varieties of purpura. When the affection is simple, apyretic, not accompanied by hemorrhages from the mucous membranes, and when it is discrete and limited to certain regions, as the lower extremities for example, it may be due to growth, fatigue, intellectual overwork, or anæmia. The affection may then be differentiated from Werlhof's disease by its etiology and its general characteristics. If it is accompanied by grave general symptoms or hyperpyrexia, its infectious nature may be suspected.

Scorbutus may be differentiated by the predominance of gingival lesions, by the bony swellings, and by the exciting causes.

We must not forget that hemorrhagic smallpox begins as a true

purpura and that the gravity of the general condition in this instance far surpasses in importance the occurrence of the hemorrhages.

Purpuras which are symptomatic of organic diseases may be easily recognized by the symptoms of the latter; they occur usually only in the cachectic stage of these affections.

Treatment.

A child suffering from hemorrhagic purpura should be kept in bed in a large, well-ventilated room which is not too warm (60° to 65°). He should be put upon a liquid diet, such as milk, citric or tartaric lemonade, and ice pills in case of internal hemorrhage. Stimulating frictions may be made to the skin by means of alcohol or turpentine. If there is œdema of the legs accompanying the petechiæ, the parts should be wrapped in cloths wrung out of a solution of chloride of ammonium (an ounce and a half to a quart).

The tendency to hemorrhages may be combated by citric acid (one-half to one drachm in potion), orange juice, syrup of catechu or rhatany, the perchloride of iron (twenty drops a day in sweetened water), ergot, quinine, or digitalis. In cases of grave epistaxis the nostrils must be plugged. If the child is exsanguine and threatened with death from the excessive hemorrhage we may be obliged to resort to the transfusion of blood or to an injection of artificial serum (five or ten drachms of salt to a litre of sterilized water). This serum may be injected subcutaneously or directly into a vein. It is a stimulant of the first order.

Infantile Scurvy.

Scorbutus occurring in infants has been described in England by Barlow, Gee, Cheadle, and Howard Marsh; in America by Northrup, Taylor, and Fruitnight; in Germany by Heubner. Most writers call the affection Barlow's disease in honor of the writer who first gave an accurate description of it fifteen years ago.

Although common in England, Germany, Holland, and the United States, the disease is very rare in France.

Infantile scurvy is a blood dyscrasia which may complicate rickets (acute rachitis, or hemorrhagic rachitis of Fürst), but which does not involve directly or primarily the osseous system. Scurvy is the same at all ages and it is manifested in the child as well as in the adult by the same symptoms: rapid and progressive cachexia, profound anæmia, fungous and bleeding gums, osseous and articular pains due to subperiosteal and articular hemorrhages, petechiæ, hemorrhages in various locations, etc.

Etiology.

Infantile scurvy is an acquired hemorrhagic diathesis due to bad feeding, artificial feeding, the want of fresh milk and its substitution by condensed milk, farinaceous foods, etc. That this is the true cause is shown by the fact that the disease is recovered from upon a return to a normal diet, such as fresh milk, meat juice, green vegetables, and acid fruit juices.

It has been noticed in England and in the United States that the poorer classes furnish fewer cases than the upper classes, a difference which is explained by the fact that although the poor feed their children unhygienically, giving them too soon coarse and indigestible food, soups, vegetables, etc., they have no money to buy the much advertised substitutes for milk. The rich, on the other hand, make use of these artificial products. Of thirty-three cases seen by Barlow, six only were encountered in hospital practice. Breast-fed children are never subject to scurvy; the children who are fed with fresh, boiled, sterilized, or pasteurized milk also escape, and cases which have been referred to the use of sterilized milk have not been referred to the true cause.

Whatever may be the cause, infantile scurvy is rare. American writers have, it is true, reported about a hunded cases, the English some forty, and the Germans about a dozen, but these it must be remembered are out of millions who are artificially fed and out of thousands who become rachitic without suffering from scurvy. The Anglo-Saxon race appears to be more predisposed to this malady than the Latin. Perhaps also we may take into consideration the use of condensed milk which is very common in Northern countries but much less so in Southern.

Scurvy does not appear during the first months of existence but only towards the end of the first year and the beginning of the second, between eight and eighteen months, in this respect resembling rickets with which it is often seen associated. It may, however, occur earlier, at the age of six or of four months, or even of a few weeks (Jacobi). It may also appear at a later period, and Barlow is said to have noted certain cases between the ages of two and ten years, being thus intermediate between infantile scurvy and that of adults.

Babes is said to have discovered a bacillus which he regarded as the pathogenic agent of scurvy, but this discovery, which would place infantile scurvy among the infectious diseases, requires confirmation. According to Barlow and Fruitnight infantile scurvy is caused by a

chemical alteration in the blood, by a deficient alkalinity of this fluid consequent upon malnutrition. Northrup believes that it is a dyscrasia affecting the capillaries and permitting an escape of blood from the vessels.

Pathological Anatomy.

In a post-mortem examination of three children aged respectively ten, nineteen, and twenty-three months, Barlow found the following lesions: extravasation of blood beneath the periosteum of several bones, separation of the lower epiphysis of the femur and other lesions of rachitis, a very vascular periosteum, subperiosteal hemorrhage of the right tibia, medullary and muscular hemorrhages, rarefaction of the spongy tissue of the bones, subperiosteal hemorrhages of the scapulæ and similar lesions of the ribs, separation of the costal cartilages from the bones, and other subperiosteal effusions. In one case there was an intrapleural effusion with petechiæ in the parietal pleura; in another case there was a hemorrhagic focus in the lung; in the third case there was a subcapsular hemorrhage of the spleen.

The blood presents all the characteristics of anæmia, such as diminution of the red corpuscles as well as of their contained hæmoglobin. There is little or no alteration of the leucocytes.

Symptoms.

A child, often one who is rachitic, who is suffering or has suffered from digestive troubles and is poorly nourished, becomes gradually quiet, weak, and irritable at the same time that his muscles grow soft and his face becomes pale. While lying in his cradle the baby makes no sound, but if taken up to be carried about or to be bathed he cries, the limbs seeming to be painful and paralyzed at the same time (scorbutic pseudoparalysis). Soon we notice a swelling on the leg or the thigh; this swelling is not inflammatory in character, it is hard rather than fluctuating, and is sometimes accompanied by œdema and purpura; deep-seated and osseous, it may be seated upon the flat or the long bones, the scapulæ or cranial bones, as well as the femur or tibia; the upper extremities escape or are affected only late in the course of the disease.

The lesions are not always symmetrical and the articulations remain free although the swelling may be in their immediate neighborhood. We sometimes see abnormal mobility and crepitation at the epiphyseal junction due to spontaneous separation of this part; this is found usually at one of the extremities of the femur or at the upper end of the tibia.

The eyes become prominent and there may be a true exophthal-

mus on one or both sides as a consequence of intraorbital hemorrhage.

The lesions of the gums, although characteristic, are absent when there are no teeth. They consist in a swelling of the gums, which become fungous and bleeding; the teeth become loosened and fall out, and the mouth is filled with a sanious and foul-smelling secretion. But as just said, if the baby has no teeth the gums remain unaffected and they are only slightly involved when the teeth are few in number. Among the digestive disturbances have been noted vomiting, diarrhœa, and melæna. On the skin we see purpura and ecchymoses. The spleen has been found enlarged in some cases. Albuminuria is absent or little marked. No cardiac or pulmonary symptoms have been recorded.

The general condition is bad. The child is very anæmic, presenting a waxy pallor and a cachectic appearance; he may be unable to stand or sit, refusing to walk, and wishing only to be left undisturbed. Thus, in short, we find anæmia, asthenia, and cachexia. There is no fever in uncomplicated cases; but unfortunately in infantile scurvy there are often most serious complications, such as bronchopneumonia and pleurisy, which may terminate in death after a period of more or less marked pyrexia.

Prognosis.

Infantile scorbutus follows a slow and progressive course; it may last from two to four months, but may be interrupted by remissions which prolong its course. The prognosis is not bad when the disease is recognized in time and treated immediately; but when unrecognized or neglected the disease may terminate fatally.

Diagnosis.

Errors in diagnosis are common but may be avoided by attention to the three associated symptoms, namely, swelling of the bones, fungous condition of the gums, and purpura. This symptomatic triad is accompanied by cachexia and anæmia. Infantile scurvy has been confounded with acute rachitis, which may be differentiated, however, by the curvatures and epiphyseal enlargements, by the absence of purpura, gingivitis, and swelling of the shafts of the long bones. When these symptoms accompany rickets they constitute a complication and are not an integral part of the disease. I have seen a rachitic child with inflammation and ulceration of the gums, a fetid and sanious discharge, and loosening and falling of the teeth; but the child had neither purpura, hemorrhages, nor diaphyseal swelling; it was a cachectic and rachitic, but not scorbutic child.

Scorbutic pseudoparalysis may lead us to think of infantile paralysis (acute anterior poliomyelitis), but the latter is not accompanied by osseous swellings or hemorrhages. Syphilitic pseudoparalysis may also be differentiated by the absence of any scorbutic symptoms.

A scorbutic baby has been regarded as suffering from a traumatic fracture of the femur and has been placed in an apparatus; in another case the diagnosis has been made of osteosarcoma of the femur; a third case has been diagnosed as one of sarcoma of the eye, and a fourth as sarcoma of the gums. The differentiation is not difficult from acute articular rheumatism, various forms of acute stomatitis, purpura hæmorrhagica, or hæmophilia. Whenever there may be any doubt as to the nature of the case, diagnosis may be speedily established by the results of treatment.

Treatment.

As soon as the disease has been recognized, or even if it is only suspected, we must change the infant's diet, excluding condensed milk or any other artificial preparations, and give only fresh Pasteurized or recently boiled milk, meat juice, orange juice, or grape juice (half an ounce daily in divided doses every hour or every other hour). A purée of potatoes in milk may also be given.

Under the influence of this antiscorbutic diet we see a transformation in the child's appearance in the course of a very few days; he regains his color and his strength, and in a word, revives. The gums become firm; but if they remain soft and bleeding we may touch them with lemon juice. If there is epiphyseal separation the limbs should be immobilized, but the child must nevertheless be carried into the open air. Jacobi advises phosphorus in doses of 1 mgm. (gr. $\frac{1}{60}$) a day.

As a preventive measure we should forbid the exclusive and premature use of condensed milk or of any of the farinaceous preparations which have been vaunted as substitutes for human milk. Sterilized cow's milk, which has sometimes been accused of causing the disease, is in this respect inoffensive and can never of itself cause infantile scurvy.

In France during the past few years the use of sterilized milk has become almost universal, and a very large number of children are nourished with it from the moment of birth; and this milk, whether sterilized at home at a temperature of 100° to 102° C. or in special establishments at a temperature of 110° C., has never been found to cause scurvy, for if it could cause it this disease would sometimes be encountered in our country; but as a matter of fact it is unknown here.

DISEASES OF EVOLUTION.

Athrepsia.

The name athrepsia (*α-θρέψις*) was given by Parrot to a series of morbid symptoms well known before his time, but which he grouped together and described in a remarkably clear manner. It was for a long time known that new-born children, when badly nourished, deprived of breast milk, and stuffed prematurely with coarse food, rapidly fell into a condition of special cachexia, with atrophy of the flesh and staining and wrinkling of the skin, etc. Valleix described this condition in connection with thrush, Bouchaud spoke of it as a form of inanition, and Hervieux called it progressive algidity of nursing infants. But these authors did not picture atrophy of the new-born in a way to attract the attention of their readers or to fix the syndrome in their memory. Parrot was more happy in this regard, yet we may accuse him of an excessive generalization, by which he was led to describe under the name athrepsia many different affections which are encountered with it only as complications, such as thrush, erythema, sclerema, and trismus.

The inanition, whether primary (through insufficiency of nourishment) or secondary (faulty assimilation due to digestive troubles), and the autophagia resulting from it are the chief facts of athrepsia. Without doubt various forms of infection may determine the dyscrasia or engraft themselves upon it, but they are not indispensable to its production.

Athrepsia may therefore be defined as a general dystrophic disease peculiar to the new-born, beginning with digestive troubles and ending in profound emaciation with the characteristic wrinkled facies.

Etiology.

The causes of athrepsia are banal and we may provoke the disease at will. "Give me a new-born child as robust as you will," said Parrot, "and by hospitalization and a faulty alimentation I will make him athreptic." This assertion was only too well verified during the siege of Paris in 1870–71, when the lack of milk and of nurses punished so cruelly the new-born.

Although any child may become athreptic, those born before term, the delicate, weak, malformed (with harelip), or those affected with hereditary syphilis are more predisposed than others to marasmus.

The acute diseases of infancy, even simple coryza by interfering

with nursing, may lead to athrepsia. The disease is more common in summer, because of the digestive troubles which artificially fed children may acquire in consequence of fermentation of the cow's milk. Indeed the nursing bottle, irregular feeding, premature weaning, and the giving of indigestible substances are the prime factors in the production of athrepsia. Most commonly the disease arises in consequence of the substitution of breast milk, the natural food of the new-born, by cow's milk or some artificial preparation. The surroundings of a city, and especially of a hospital, are peculiarly unfavorable for this substitution, which may be accomplished sometimes in the country with less disastrous results. Breast-feeding can lead to athrepsia only when it is insufficient by reason of a small amount or poor quality of the milk, depressed nipples, fissures, mammary abscess, or some disease of the mother or wet-nurse.

Whatever may be the cause, the pathogenesis is always the same: the child is badly nourished, he does not assimilate properly, and falls off, the losses being greater than the income. Soon gastroenteritis enters upon the scene, we have vomiting and diarrhœa, and the action of various microbes hastens the process of denutrition.

To this first gastroenteric stage succeeds the hæmatic stage, the dyscrasia; the blood becomes impoverished and circulates badly, whence result cyanosis of the extremities and venous thrombosis; the secretions diminish (anuria); the denutrition of the organs renders them more vulnerable, the skin and mucous membranes become inflamed and ulcerated, and so the withering goes on.

A third stage, encephalopathic, follows upon the first two; it is characterized by convulsions and coma. The badly nourished brain, poisoned by the toxins which the emunctories fail to eliminate, declares its condition, and death does not delay.

Pathological Anatomy.

All the lesions of athrepsia were described minutely by Parrot. On the side of the digestive tract we find muguet, which may pass from the mouth into the pharynx, œsophagus, stomach, and even intestine. On the gastric mucous membranes we may see minute, round, superficial ulcers (1 to 2 mm. in diameter), ecchymoses, and hemorrhagic effusions; these lesions predominate on the anterior surface, at the pylorus, and on the greater curvature. The peptic glands are destroyed, the connective tissue proliferates, and we have both parenchymatous and interstitial gastritis. More rarely we find pseudomembranes, diphtheroid exudations, and œdematous congestion of the gastric mucous membrane in cases of athrepsia (catarrhal

gastritis). These minute erosions may also occur in the œsophagus. The intestine is relatively healthy, or possibly slightly congested.

In the cranium we see the bones overriding each other, projecting ridges in the place of the sutures, and asymmetry of the skull resulting from absorption of the cerebrospinal fluid, which occurs as part of the progressive desiccation of the organs. The brain substance is the seat of softening, hemorrhage, and diffuse or circumscribed interstitial steatosis (fatty infiltration of the neuroglia elements). This steatosis sometimes invades the meninges and the arachnoid. It is a dystrophic lesion and in no sense inflammatory. The cerebral softening of athrepsia is white or red, and often depends, as does the hemorrhage, upon thrombosis of the sinuses. The hemorrhage may be cerebral, ventricular, or meningeal, the most common being subarachnoid hemorrhage, chiefly of the dependent portions. Otitis media, a more or less intense inflammation of the tympanum with a cloudy serous effusion of thick pus, has been observed. On the side of the lungs we find the degenerative changes of alveolar steatosis, emphysema, and atelectasis.

In the kidneys we find fatty degeneration, thrombosis of the renal veins, hemorrhages, and uratic infarctions (crystals of urate of sodium in the tubes of Bellini and the pelves). The blood is profoundly altered; in the acute form the number of corpuscles is increased by reason of the concentration of the fluid, sometimes to six or seven millions per cubic millimetre. In the chronic form there is a diminution in their number. The blood is dark, of sirupy consistence, and readily coagulable, whence the venous thrombosis.

Symptoms.

The scene is opened by the digestive troubles. The stools are softer, more frequent, less homogeneous, streaked with green, sometimes watery and fetid. This diarrhœa is the rule, but is not constant. It is often accompanied by vomiting. The urine is scanty and dark in color. The buccal mucous membrane is dry, red, and acid; it is eroded behind the palatine vault, and along the sides (pterygoid ulcers). On the buttocks, round the anus, and about the genitals we see a more or less extensive erythema complicated by erosions, papules, fissures, and ulcerations. There are ulcers also on the heels and over the malleoli, due to pressure of the limbs one against the other or of contact with the bedclothes.

The most striking feature is the emaciation of the body, the progressive atrophy through disappearance of the fat and muscles, and the shrivelled and wrinkled look of the skin covering the skeleton. The

child dries up, withers, mummifies; his wrinkled face gives him the appearance of an old man or a monkey. His eyes are open but fixed and expressionless, the globes are sunken in the orbits, the conjunctiva is red, the cornea is dull and sometimes ulcerated. The mouth seems too large, the cheek bones and the chin form exaggerated prominences. The fontanelles are depressed, and the lines of the sutures are marked by ridges due to the overriding of the cranial bones. If athrepsia has advanced rapidly the atrophy has not always had time to be produced, and we may see instead œdema or sclerema (athreptic induration of the new-born).

The child, which is at first cross and noisy, soon loses the strength to cry and lies quiet or emitting only low complaints. It opens its mouth, seizing with avidity the breast or the nursing bottle presented to it, but drops it immediately, not having the strength to suck.

The thighs and legs are shrivelled, the toes and nails are curved, the extremities are livid and cold, the pinnæ of the ears are thin, pale, and transparent. The pulse may fall to 60, 50, or 40 per minute; the heart sounds are dull and enfeebled; the respiratory movements are also retarded; the thermometer in the rectum shows a temperature of not more than 36°, 35°, or even 34° C. (97° to 93° F.). If the child is weighed it will be found to have lost a quarter, a third, or even half of its former weight.

Towards the end are manifested the symptoms which Parrot has described under the term athreptic encephalopathy, and which follow oliguria or anuria; they are uræmic in origin, and we may find albumin or sugar in the urine. The child falls into coma with contraction of the pupils and general anæsthesia, and is in a state of apparent death; from time to time, however, there occur some muscular contractions, more rarely general convulsions, epileptiform or tetaniform in character; death is near.

Among the most common complications are bronchopneumonia, often latent and insidious, without much dyspnœa, cough, or marked elevation of temperature; erysipelas about the umbilicus, peritonitis, and gangrene of the skin.

We may distinguish two forms of athrepsia: 1. An acute or rapid form, causing death without previous cachexia, which is due to intestinal infection (foudroyant athrepsia, choleriform or cyanotic athrepsia, cholera infantum). 2. A subacute form, slow and chronic in its course, which corresponds to the type described by Parrot. In this form there may be remissions and relapses, or the affection may end in recovery; its duration is of several weeks or months.

Prognosis.

In order to arrive at a satisfactory prognosis regular weighings of the child are necessary. A steady loss of weight is a bad sign; on the other hand, if there is a daily gain, or a recovery after some losses have occurred, recovery is not impossible. Great falling-off in weight is of evil import, as is also a great reduction in temperature. As long as the temperature oscillates around 37° C. (98.5° F.) the situation is not desperate.

Treatment.

Instead of treating athrepsia it would be better to prevent it. "Every new-born child," said Parrot, "should be nourished by its mother, or if that is impossible by a wet-nurse, and it ought to take no other food than the milk which it draws from the breast." If the child is too feeble, premature, impossible of being kept warm, it should be placed in a *couveuse*, or incubator, at a temperature of 30° or 32° (86° to 89° F.), and be fed by means of a tube. The artificial incubation and the gavage may be prolonged for two, three, or even four weeks, if necessary. When the child has become stronger he is to be put to the breast, the natural feeding being associated with gavage for a time—reinforcing gavage—until he is able to nurse sufficiently without assistance. In the case of weak children we must use at first only human or asses' milk.

Infants deprived of the services of a wet-nurse may be put to breast to an animal, an ass or a goat, but usually they are brought up on the bottle. We must use the utmost cleanliness in bottle-feeding. A bottle which has no tube attached should be employed, only boiled or sterilized milk should be used, the repasts should not be unnecessarily multiplied (with intervals of two or three hours), and an excessive quantity of milk should not be given. In this way we may avoid the indigestions, infections, and gastroenteritis which lead to athrepsia.

When the disease has once become established we must combat it by replacing the defective alimentation by a suitable one, treating the diarrhœa, and increasing the little patient's strength. The milk may be diluted with lime water or Vichy water (two or three ounces to the quart); repeated doses of bismuth may be given to arrest the diarrhœa, and if the bismuth fails we may give hydrochloric or lactic acid. A little dilute alcohol in sweetened water may serve to rally the forces of a failing baby. If there is very obstinate vomiting we may wash out the stomach and forbid the ingestion of fluids for some hours. Antiseptic baths of sublimate, 1:10,000, or mustard baths

may render good service. If milk is not borne it may be replaced temporarily by carbonic water, rice water, egg water, lean bouillon, or Sydenham's decoction (bread crumb, white sugar, gum arabic, and phosphate of lime, boiled in water and flavored with orange-flower water).

The child is to be enveloped in cotton wool to prevent the loss of heat, and also to be surrounded by hot bottles. He should be made to inhale oxygen.

If the condition improves we must return to sterilized milk or that deprived of its casein by means of rennet or Gärtner's centrifugal machine (humanized or maternized milk). This is lighter and better borne by delicate children than ordinary cow's milk.

Morbid Growth.

It is said that a child is suffering from his growth when in the course of a more or less rapid increase in stature he becomes pale and feeble, when he loses his appetite, emaciates, complains of pain in the head and extremities, and when he suffers from palpitation, shortness of breath, etc. All that is vague and ill-defined, but the association of symptoms is encountered frequently enough in the large cities, in children who lead sedentary lives and are overworked intellectually, in school children, and in those of weak constitution and nervous temperament.

Etiology.

It is during later childhood, as puberty approaches, between the twelfth and fifteenth years, that we see usually an increased rapidity of growth accompanied by morbid manifestations.

Children who live much in the open air and in the country are but little exposed to these morbid symptoms, which are more especially the lot of city children, overworked physically and mentally and deprived of a sufficiency of pure air and exercise. The troubles of growth are more common than elsewhere in boarding-schools where all the scholars are subjected to the same discipline and the same diet, where the food sometimes is wanting in both quality and quantity, where the ration of maintenance is given to children who demand the ration of growth, where the hours of study are too long and the hours of recreation are too restricted.

Certain diseases, such as typhoid fever, predispose to increased growth, which is sometimes manifested by red lines at the knees due to a cracking of the skin which is unable to follow in its growth the rapid increase in length of the skeleton.

Sometimes heredity has a part in the production of these accidents, certain nervous, arthritic, or scrofulous children seeming to be predisposed to their occurrence.

Symptoms.

The rapid increase in length of the bony framework of the body may find expression in various troubles affecting different systems. We will consider these separately.

Osseous System.—There have been noted dull, deep pains, either in the shafts of the bones, in the epiphyses, or about the joints, without appreciable swelling, and without any redness of the skin. Walking, fatigue, and pressure reveal the existence of these ostealgias. According to Bouilly there is a very mild form of juxtaepiphyseal osteitis associated with the fever of growth. But the pains are often very vague, are met with especially in very nervous subjects, and various causes unconnected with growth may exist to explain the occurrence of fever. Besides the bony pains we sometimes find swelling, abortive forms of osteitis, situated especially on the upper part of the anterior surface of the tibia (the apophyseal osteitis of Lannelongue). Tarsalgia of adolescence and various arthralgias may be attributed to anomalies of growth. Scoliosis and other vertebral deformities, so common in girls, coincide with growth, but are favored especially by vicious attitudes in school.

The osteogenic exostoses which occur at the points where the growth of the skeleton is most active, namely, the extremities of the long bones, are the most distinctly marked of the anomalies of growth. All these manifestations may be accompanied by pain (growing pains); this is a fact which must be borne in mind, but not regarded as universal, otherwise we may fall into regrettable error in diagnosis; for a mind always looking for troubles of growth may easily overlook cases of rheumatism, osteomyelitis, etc.

Circulatory Apparatus.—Palpitation of the heart is frequent; it occurs spontaneously or is excited by very slight efforts. It may be accompanied by hypertrophy or dilatation of the heart when the child is physically overworked during the period of rapid growth; it is especially frequent in nervous and anæmic children. We often find in children with irritable heart some hereditary taint, such as tuberculosis, hysteria, or alcoholism. A true cardiac hypertrophy of growth, such as that described by Germain Sée, does not exist; growth by itself alone cannot cause an abnormal and disproportionate development of the heart.

The anæmia may be the effect of too rapid growth; it is mani-

fested by pallor of the skin and mucous membranes, by heart murmurs, weakness, dyspnœa, etc.

Nose-bleed is frequent in rapidly growing children, and purpura simplex on the lower extremities has also been observed in them.

Nervous System.—In children in whom a predisposition exists growth may hasten the explosion of certain neuroses, especially chorea and hysteria; but we see with peculiar frequency pains in the head (cephalalgia of growth), affecting school children and young men who are preparing for examinations, overworking the brain by excessive study. These pains return with each attempt at intellectual labor, and cease during rest; they may last for months or years (R. Blache).

Children who are fatigued by the processes of growth suffer from general lassitude, an apparent laziness which is unusual to them, and a need for longer hours of sleep; this is the nervous exhaustion, the neurasthenia, of growth. It has been said that the cephalalgia of growth is dependent upon a defect in accommodation (accommodative asthenopia), but this is incorrect in the majority of cases. Neither does it depend, as has been alleged, upon hypertrophy of the heart, which is an exceptional condition. It might more rationally be attributed to dyspepsia.

Among the other nervous symptoms which have been observed are pleurodynia, intercostal neuralgia, and epigastralgia.

Digestive Tract.—Children whose growth is abnormally rapid often have a poor appetite with a disgust for food, especially for meat. Their digestion is poor, painful, and often accompanied by flatulence with belching of gas; constipation is the rule, and thirst is always excessive. In a word, the symptoms are those of atonic dyspepsia.

Female Genital Apparatus.—In young girls we often observe certain troubles which make their appearance at the time of puberty; the menses do not appear or are established with difficulty, causing pain and being accompanied by leucorrhœa. In addition to this dysmenorrhœa we sometimes see attacks of congestion of the breasts. The engorgement of the breasts of growing girls is often very painful and may even, although rarely, cause mammary abscesses. I have seen an example of this in a girl of fourteen years. Most of these symptoms on the part of the genital apparatus in adolescent girls are usually transitory and devoid of gravity.

Treatment.

The treatment should be above all hygienic in character. Children who are developing poorly, who grow too rapidly, and are suffering from their growth should be regarded as delicate children, as

convalescents, who must be surrounded with special hygienic precautions.

All are benefited by country life in the open air, for the "air cure" tones up the nerves and enriches the blood. Their exercises should be graduated in proportion to their strength; prolonged repose, laziness without ennui, and a generous dose of sleep are more strength-giving than activity pushed to the point of fatigue. The growing child ought to expend little and receive much. The first indication will be met by repose; the second by a diet rich in nutritive principles and easy of digestion, such as hashed or scraped meat, purées of dried vegetables, eggs, milk products, fresh fish, bread, cooked fruits, etc.

The use of cold water externally, rubbing, massage, and sea baths are powerful tonics which may be recommended. All serious intellectual work and hard study must for the time be abandoned.

Dentition.

The eruption of the first teeth, which normally begins at about the sixth month and continues up to the age of twenty-four to thirty months, coincides with a period of life which is prolific in maladies. During the first dentition, indeed, we find the beginning of rickets, infantile scurvy, convulsions, bronchopneumonia, various dermatoses, infantile diarrhœa, etc. All this pathology, so extensive and so varied, may be encountered at the same time with the physiological work of dentition, whence has arisen the common tendency to associate the two in a relation of cause and effect. We have first to inquire whether there are any diseases of dentition, and if so, what these diseases are. But before doing so it will be well to review the process of evolution of the first teeth.

Eruption of the Milk Teeth.

When a child is well nourished (breast-fed), when he is healthy, and when he is normally developed, he cuts his teeth regularly and without suffering. The first tooth shows itself at the age of six, seven, or eight months, and is one of the lower middle incisors which is soon followed by its mate, and so at the age of seven or eight months the child has two teeth. If the infant is poorly nourished or if its growth is retarded by some hygienic or pathological cause, the first tooth may not appear until the twelfth or fifteenth month. The upper median incisors appear after the lower ones, and then the upper and lower lateral incisors; this group of eight incisors is usually complete at about the age of twelve to fourteen months. After the

eruption of the incisor group, which occurs as we have seen in two or three stages, there is a period of rest of two or three months before the appearance of the bicuspids, which come out the upper before the lower; the child now has twelve teeth and is about eighteen months old. The third group, four canines, appears at the age of twenty, twenty-two, or twenty-four months. The fourth group, four molars, is cut in the course of three or four months and is not complete until the age of two or two and a half years. The child then has its twenty temporary teeth. If it is rachitic the eruption of its teeth will be delayed, and the twentieth may not be cut until the child has reached the age of three or even four years.

The permanent teeth do not make their appearance before the age of six or seven years. At this age we note the eruption at the back part of the jaw of a third molar, called the sixth-year tooth, which brings up the number of the teeth to twenty-four. Later the milk teeth fall out and are replaced by the permanent teeth to the number of twenty-eight (eight incisors, four canines, and sixteen molars).

Disorders of Dentition.

Both local and general affections have been attributed to the evolution of the teeth.

Local Affections.—In healthy, well-nourished children the local troubles are not marked; there may be drooling, heat and redness or a slight swelling and tenderness of the gums, or even a mild gingivitis—in short, an abortive stomatitis, which is more usual during the eruption of the molars or canine teeth than of the incisors. This is far from being a condition of any gravity. Sometimes more severe symptoms, such as erosions, muguet, and ulcerative stomatitis, have been noted, but not in breast-fed children. Stomatitis is due to an infection for which a port of entry is necessary, but this is sometimes found in a precocious caries of the teeth, perhaps hereditary in its nature. These local symptoms are seldom of any gravity, but may become serious in puny, poorly nourished children, and in those who are bottle-fed in case the bottles are not kept clean. There is here a true infection, and the process of dentition has little to do with the condition.

Reflex Symptoms.—A fever of dentition has been described; I have never seen it, and it would appear to me to be rather difficult of explanation; in any case it must be indirectly produced. The child, worried by the eruption of the teeth, nurses incessantly and digests badly, has diarrhœa and a little gastroenteritis, is restless, sleeps poorly, and has fever. In other cases it has a cold, and the fever,

which is called a fever of dentition, is merely due to an accidental infection.

A diarrhœa of dentition has also been described. This is a diarrhœa which appears at the time of eruption of each tooth and subsides when the latter is fully out. It has been regarded as a reflex phenomenon, but it may depend simply upon overfeeding, arising from the fact that the child's gums are itching and uncomfortable and this leads it to nurse too frequently.

The cough of dentition or the bronchitis of dentition is less easily explained as a consequence of the eruption of the teeth. It is probable that an accidental cold is more often the real cause than is any influence arising from the cutting of the teeth.

Attacks of eczema, strophulus, urticaria, and erythema, in fact all the dermatoses of childhood, have been laid to the charge of dentition; but they depend on either a defective alimentary hygiene or some hereditary diathesis, such as scrofula, herpetism, arthritism, or syphilis.

Convulsions are the special lot of nervous children descendants of alcoholic, epileptic, hysterical, or diabetic parents; the eruption of the teeth plays but an insignificant rôle in their production. Dental pseudomeningitis can be explained in no other way.

From what has just been said we see that we cannot accept dentition as a cause of disease, except possibly as an aid to classification; in reality the "diseases of dentition" depend upon various causes having no relation to this physiological process. This is a point in diagnosis which has an important bearing upon both prognosis and treatment.

Treatment.

In the management of this period we must insist especially upon the institution of hygienic measures suitable to prevent the retardation or anomalous eruption of the milk teeth. If there is pruritus or any swelling of the gums, we may prescribe an application of some soothing balsam containing minute quantities of cocaine or belladonna. At the same time the mouth should be washed with Vichy water, boric-acid solution, or simply boiled water. Lancing the gums in order to remove any obstacle to the eruption of the tooth is a deplorable and superfluous routine practice which I have never resorted to and which I do not hesitate to condemn as a useless and dangerous operation.

Diseased milk teeth should be carefully attended to in order to relieve or prevent caries and to prevent the premature falling of the teeth in order that a place may be kept for the permanent teeth.

DISEASES OF THE MOUTH.

Diseases of the mouth are very common in children. They are grouped together under the general name of stomatitis, indicating the inflammatory process common to all of them, and are for the most part of parasitic origin.

Perlèche.

This affection, which was described for the first time by Justin Lemaistre, of Limoges (in 1886), is a benign stomatitis located at the labial commissures, occurring in children.

Etiology.

Perlèche is very common in school children, in the city as well as in the country. In Limousin it is called *bridon* (snaffle), because of its symmetrical occurrence at the labial commissures, looking like the mark of a bridle. The name perlèche comes from the habit the patients have of incessantly licking the corners of the mouth (*se pourlécher*).

The fact of contagion is evident in most cases. The greater number of children in a family, a school, or any group whatever suffer simultaneously or successively from perlèche. More rarely adults, the relatives of the affected children, acquire the affection through kissing or the use in common of napkins, glasses, or other table utensils. In the public schools the contagion is often spread by the habit of the children of drinking directly from a faucet, or from the same cup or water pitcher. The parasitic nature of perlèche is also shown by the results of bacterioscopic examination in which a microbe (streptococcus plicatilis of Lemaistre) has been found. This is regarded as pathogenic by some, as an inoffensive microorganism by others. The microbe has been found not only on the lips of affected children but also in the water of wells and infected springs. It is said to be anaërobic and to grow with difficulty elsewhere than in the labial folds, being unable to extend either on the face or inside the mouth. The lesion is very superficial, limited to the epithelium, and never invading the derma of the buccal mucous membrane.

It is believed by P. Raymond that perlèche is due to the presence of the ordinary microbes of suppuration, especially the staphylococcus aureus, and he regards it as related to impetigo. Without examining into the bacteriological question, we may assert that clinically there is no relation between perlèche and impetigo. Perlèche is an independent and autonomous disease.

Symptoms.

The inflammatory symptoms are insignificant; a little discomfort in the more severe cases, a slight itching which causes the child to lick the parts with his tongue, a little interference with the movements of the mouth in mastication, yawning, and laughing, but no pain. In a word, there is little or nothing beyond the objective symptoms.

The appearance of the lesion is characteristic. In place of the ordinary distinctness of form, color, and consistence of the labial commissures we see folds and thickenings of the mucous membrane which disfigure the corners of the mouth. The epithelium looks as though it were macerated or cauterized, seen best when the child opens his mouth. We see then that the lesion is strictly limited to the border of the commissures, scarcely encroaching upon the mucous membrane internally or the skin externally; it lies like a saddle over the mucocutaneous fold.

The lesion varies much in degree. Sometimes there is only a faint opaline tint betraying a slight thickening and maceration of the parts; sometimes the lesion is quite plainly in relief; sometimes we may even note the presence of fissures, from which blood is oozing, and crusts due to scratching, uncleanliness, etc.

Perlèche is rarely complicated by any signs of irritation in the neighborhood, but lymphangitis or submaxillary adenitis is possible. The children are so little inconvenienced and the parents so little worried by the presence of perlèche that they very often forget to speak of it to the physician who may have been summoned for some other cause, and who discovers it accidentally. No function is interfered with by the affection and the general condition is not disturbed by it.

Diagnosis.

After a little experience this small lesion is readily recognized. Its symmetry and its limitation are characteristic in themselves, and all doubt will be removed by a recognition of its eminently contagious nature and its simultaneous attack upon all the children in the neighborhood. Nevertheless it might be confounded with mucous patches, and this mistake has actually been made. In order to avoid it we should remember that perlèche is an affection of schools, that it does not attack the new-born, that it is met with in children in perfect health, and that it is accompanied by no stigmata. Mucous patches are thicker, more vegetating in appearance; they spread internally and externally, they coexist with fissures and with buccal, labial, and anal syphilides.

Treatment.

A cure of perlèche may easily be obtained by touching the parts every day or every other day with tincture of iodine, three or four applications of which will suffice. In order to prevent the disease and hinder its propagation we should forbid the promiscuous use of toilet articles and utensils for the table. Direct contact between the sick and the well should also be forbidden.

Geographical Tongue.

This is a very common affection of infants, although it may also be encountered in older children and adults. It is probably a parasitic disease due to the presence of some undetermined fungus.

Synonyms.—Lingual desquamation, epithelial glossitis, desquamative glossitis, eczema of the tongue (Besnier).

Etiology.

Parrot, who frequently saw lingual desquamation among the athreptic children of the Hospice des Enfants-Assistés and among syphilitic children, regarded it as a stigma of hereditary syphilis. Fournier, while not making desquamative glossitis dependent upon syphilis, classes it among the indirect consequences of the disease, looking upon it as a parasyphilitic affection. It is, however, easy to assure one's self by a systematic examination of all nursing children in the clinics and the hospitals, that lingual desquamation is in no way related, nearly or remotely, directly or indirectly, to syphilis. It is a trivial affection which I have seen hundreds of times in bottle-fed children after the introduction of soiled objects into the mouth. Breast-fed children are only exceptionally affected.

The parasitic nature of the affection, which is very probable, judging from its form and its clinical appearances, remains to be proved. Its relation to eczema, suggested by E. Besnier, would not be contradicted by the discovery of its parasitic nature.

Symptoms.

The affection appears to cause no inconvenience to the nursling, and may therefore pass unperceived; in very rare instances, however, the child may give evidences of pain or of difficulty in nursing. The lesion varies in form and extent. It occupies the dorsum and borders of the tongue. It appears as a whitish thickening, a sort of epithelial proliferation; the thickened epithelium afterwards falls, leaving behind a smooth mucous membrane, looking as if varnished, and de-

pressed in comparison with the neighboring plaques. These places are numerous and circular or arciform in shape. The union and mutual interference of these patches give rise to most curious geographical forms on the dorsum of the tongue. Gradually the exfoliation involves nearly the entire surface of the tongue, to be covered again by new patches of thickened epithelium. The disease affects a serpiginous course, the old patches healing to give place to new spots. In some cases the outline of the affected areas is not circular but very irregular. The disease is slow in its course, chronic, interminable, lasting perhaps for years, but it is benign and without serious complications.

Diagnosis.

The diagnosis of this affection is extremely easy, for no other variety of stomatitis occurs with these circular depressed areas, limited by raised borders of a dull color. Muguet, spots of curdled milk, the erosions of herpes, aphthæ, and syphilis may be differentiated at the first glance.

Treatment.

The therapy of the disease is very uncertain; until we have found a specific remedy, the antiseptic inimical to the as yet unknown pathogenic agent, we can prescribe only palliatives, astringent applications, mouth washes, etc. The tongue may be smeared night and morning with a mixture of four parts of hyposulphite of sodium in fifty of glycerin.

A care for the absolute cleanliness of the nursing-bottle is the most efficacious prophylactic means at our disposal.

Thrush.

Thrush (muguet, blanchet, millet) is a parasitic stomatitis of infancy, due to the presence of a fungus, the oïdium or saccharomyces albicans.

Etiology.

The new-born, puny and sickly children, and the bottle-fed in maternities and foundling asylums are predisposed to muguet. The number of cases in these institutions is explained by the fact of contagion, the parasite being transported in the air, on spoons, or on nursing-bottles. Debility and athrepsia prepare the soil. We may also see thrush in older and healthy children, but this is exceptional. Children who are fed exclusively at the breast escape.

It has been said that an acid condition of the saliva is an indispensable pathogenic condition for the development of the fungus of this disease. But this acidity is normal in the new-born, and I have seen thrush in a little girl of two and a half years in whom the saliva was of neutral reaction. Older children become almost refractory to the thrush fungus which attacks them only in case of grave cachexia, such as occurs in the course of tuberculosis, typhoid fever, or bronchopneumonia.

The proximate cause of muguet rests in the implantation of the spores of oïdium albicans on the buccal mucous membrane, which may come from the atmosphere, from the nursing-bottle, from the breast of an uncleanly nurse, or from the mouth of an affected child. Artificial feeding constitutes the chief predisposing cause. The fungus, which was discovered in 1842 by Berg of Stockholm and recognized as the cause of the disease by Gruby of Paris, has been well studied by C. Robin. It is composed of cylindrical filaments, three of four micromillimetres in diameter and half a millimetre in length. These filaments are formed of cells articulated at their extremities, ramifying and containing molecular granules. The adherent extremity of the fungus is hidden in a mass of spores and epithelial cells. The spores are round and contain granules in which Brownian movements are seen. The tubes and the spores form white tufts mixed with cells of the mucous membrane which do not penetrate into the derma of the mucous membrane. Under the microscope we see leucocytes, various microbes, and the leptothrix buccalis in the whitish patches.

Muguet occurs on the mucous membrane of the cheeks, tongue, and palate, rarely that of the gums, the velum palati, and the pharynx. It usually spares the mucous membranes with vibratile cilia, as in the nasal fossæ and the posterior nares, but it has been found in the œsophagus, the stomach, the larynx, and the lungs. It may sometimes pass in the blood current or through the ducts of the glands to distant regions, creating metastatic foci in the parotid glands, the liver, the kidneys, or the brain. In such cases it may give rise to septicæmic symptoms.

Symptoms.

Before the appearance of the white tufts the mucous membrane of the mouth is red, dry, and acid; the child is restless and suffers from vomiting and diarrhœa (gastrointestinal dyspepsia). Soon we see on the dorsum of the tongue, the vault of the palate, and the internal surface of the cheeks one or several little white friable tufts, slightly adherent to the mucous membrane. These gradually in-

crease in size and form patches which may cover the mucous membrane of the mouth and throat, offering then an impediment to suction and deglutition. The adhesion of these patches to the mucous membrane, which is at first strong, becomes later weak at the same time that the patches assume a dirty color. If one of them is detached the mucous membrane beneath is seen to be red and injected but not ulcerated. At the same time, however, we may in certain cases observe ulcerations at each side of the palatine vault, at the line of junction with the velum (pterygoid plaques of Parrot).

The general symptoms which may be observed, such as diarrhœa, vomiting, atrophy, and cachexia, do not depend upon the thrush, but upon the defective alimentation which has prepared the soil for the growth of the specific fungus.

Prognosis.

New-born children and nurslings suffering from muguet often die, but the presence of the fungus has nothing to do with this; it is rather a witness than a responsible agent, it complicates a grave situation, but that is all. If the child is vigorous, not marasmic, the thrush will get well, for it does not kill of itself. The prognosis depends upon the kind of soil upon which the parasite has germinated, and upon the superadded complications.

Diagnosis.

The appearance of the lesions is characteristic in the early stages. The little white isolated tufts which are adherent but which can be detached with some little care without making the mucous membrane bleed, are easy of recognition. Spots of curdled milk have neither the consistence nor the form nor are they so adherent. The aphthous lesions are more circumscribed and involve ulceration of the mucous membrane. The pseudomembrane of diphtheria, which is rarely seen in the mouth, is very adherent and the Klebs-Loeffler bacillus may be found on microscopical examination. The little epidermoid cysts on the median raphé of the palate have a smooth surface and a rounded form; they are isolated and form one with the mucous membrane; when ulcerated they constitute Bednar's aphthæ. Finally, in doubtful cases a little bit diluted in glycerin may be placed under the microscope when we may readily see the feltwork of filaments and spores of the thrush fungus.

Treatment.

All alkaline solutions are very efficacious in the treatment of thrush; such are the bicarbonate, chlorate, or borate of sodium, 2 to 5 per cent., repeated every two hours. Salicylate of sodium 10 per cent., permanganate of potassium 0.1 per cent., peroxide of hydrogen, and Van Swieten's liquor succeed equally well.

If the eruption has extended to the throat and the œsophagus the child should drink Vichy or Vals water in its milk. Only boiled or sterilized milk should be given and the nursing-bottles should be thoroughly cleansed in boiling water.

Children affected with muguet should be isolated in order to prevent the spread of the contagion. In the prevention of the disease nothing is equal to a proper alimentary hygiene during the first months of life.

Erythematous Stomatitis.

This form of stomatitis, which often accompanies or precedes other varieties, may exist alone.

Etiology.

The buccal mucous membrane, irritated by contact with the feeding-bottle, by solid food given prematurely, or by sour milk, becomes red and loses its epithelium, retaining, however, at certain points, especially on the gums, little opaline collections of desquamated epithelium which are not adherent.

In very young children (seven weeks to four months) fed artificially with sterilized milk, Wertheimer has observed a marginal erythematous glossitis manifested by a bright-red color of the tip of the tongue with prominent papillæ. This inflammation, which renders nursing painful, does not extend beyond the anterior third of the tongue and gets well in eight or ten days. In order to prevent it we must see that the nipple of the feeding bottle is very soft.

The more or less difficult eruption of the milk teeth may cause swelling with redness and sometimes pultaceous deposits on the gums (gingivitis of dentition).

The contact of too hot fluids is one of the accidental causes of this form of stomatitis. Infectious diseases, such as measles, scarlatina, and mumps, are often accompanied by buccal erythema, and very often by an erythemato-pultaceous gingivitis, a true exanthem accompanying that of the skin.

Cases of gonococcal stomatitis have been reported in new-born children whose mothers were suffering at the time of their birth with a specific vaginitis.

Symptoms.

Apart from the discomfort, feeling of heat, and dryness, there are few functional symptoms. Sometimes the general condition is good, and only a local examination will show the presence of the disease. We see a more or less lively redness, of greater or lesser extent, and a smooth and varnished appearance of the mucous membrane which may seem to be deprived of its epithelium; and there may at the same time be a drooling, an almost constant symptom of the gingivitis of dentition. In this form of stomatitis the gums are swollen, of a bright or purplish-red color, often covered with a whitish, opaline, pultaceous pellicle, which may readily be removed by the finger.

If the gingivitis is intense, screaming, crying, and struggling may cause bleeding of the parts. In the case of a little boy of five years, who was suffering from gingivitis surrounding a molar tooth, every paroxysm of coughing caused the mucous membrane to bleed. The gingivitis of dentition occurs very rarely during the eruption of the incisors, being an accompaniment especially of the cutting of the canines and molars; it is wholly devoid of gravity.

Treatment.

Buccal antisepsis may be attempted by means of repeated washing of the mouth or applications of a solution of boric acid or of chlorate or borate of sodium, of three-per-cent. strength. If the saliva is very acid we may make use of lime water or Vichy. Care must be taken to see that the feeding-bottle is kept scrupulously clean, and the milk should be boiled or sterilized.

Ulcerative Stomatitis.

There are several varieties of ulcerative stomatitis, differing from the preceding by the fact of extension to the substance of the mucous membrane. These we shall briefly describe.

Simple Ulcerative Stomatitis.

In the course of whooping-cough we frequently observe a lesion on the frænum linguæ, mechanically produced, but which speedily takes on inflammatory action, becomes covered with a diphtheroid exudate, and may extend to a distance from its point of origin. I have

occasionally seen this lesion of the frænum in nursing infants who were not suffering from whooping-cough, but from a simple cold without any cough, but who had a trick of putting out the tongue and rubbing it against the cutting surface of the incisor teeth. In all these cases the mechanism is the same, there is a projection of the tongue and a wearing of its frænum against the lower incisors.

There has been described in Italy, under the name of Riga's disease, or cachectic aphthæ of Cadarelli,[9] an analogous lesion, which was later observed in France, which consists of a lesion of the frænum with diphtheroid exudate, irritation of the epithelium, and proliferation of the connective tissue.

Any grave general symptoms which may be present are independent of the local lesion, and are to be referred to athrepsia, diarrhœa, or a superadded infection. The disease is readily cured by cauterization or excision.

Similar to this form are the pterygoid ulcers occurring in athrepsia, located at the sides at the line of union of the palatine vault with the velum, and Bednar's aphthæ, which occupies the median raphé and which is characterized by simple erosions without tendency to diffusion or multiplication.

In children who have bad teeth, caries, faults of implantation, or alveolitis, the mucous membrane in the neighborhood of the lesion may become inflamed and ulcerated. The ulcer in this case is single, irregular in outline, shallow; but it may become secondarily infected and then spread widely and become fetid. The submaxillary glands may become secondarily infected and suppurate, with the unpleasant sequela of disfiguring cicatrices. In order to avoid this we should carefully make antiseptic applications to all ulcers of the mouth. Diseased teeth should be attended to and extracted if necessary.

Ulceromembranous Stomatitis.

This variety, which merits a separate description by reason of its contagiousness and specific character, has been well described by Taupin and Jules Bergeron (1879).

It is characterized by ulcerations of the mucous membrane occurring especially on the gums and internal surface of the cheeks, an abundant excretion of saliva, a foul breath, and a marked submaxillary adenopathy. It was formerly confounded with diphtheria, noma, and scurvy, but it is a perfectly distinct affection. It has been observed in the form of epidemics in barracks and schools, among soldiers and children.

The contagiousness of ulceromembranous stomatitis is beyond

question. I have seen several members of the same family attacked in succession, and remember the case of a child who was infected by its mother. In a case occurring in the practice of Bergeron, Pasteur found spirilla which could be propagated in cultures. Frühwald [10] has described a bacillus which he claims gave positive results after inoculation.

Anatomically we must distinguish two varieties of lesion: (1) Inflammatory lesions, characterized by redness, tumefaction, and an infiltration of leucocytes; and (2) destructive lesions, ulcerations, of the mucous membrane with a gangrenous exudate.

Symptoms.—At the beginning of the affection we see, on the gums and inner surface of the cheeks, yellow, roundish lesions elevated by a turbid fluid; this, which is called the bullous or purulent stage, is very ephemeral and often escapes observation. The gums of the lower jaw are more frequently affected than those of the upper. The ulceration begins on the free border and extends both laterally and into the substance of the mucous membrane. The borders of the ulcers are irregular, their surface is grayish in color and covered with a pultaceous mass composed of epithelial débris, blood, pus, and connective-tissue fibres.

The ulcers of the cheeks are situated at the junction with the alveolar processes; they are oval in shape at first, but later form by coalescence irregular and extensive losses of substance.

The ulcers appear to be covered with a grayish membrane which is strongly adherent and results in necrosis of the subjacent mucous membrane. Microscopical examination shows the presence of elastic and connective-tissue fibres in the midst of a mass of necrotic epithelial cells. This necrosis is the result of the infiltration of the derma of the mucous membrane by pus and fibrin and of the obliteration of the vessels.

From their point of origin on the gums or the inner surface of the cheeks, the ulcers may spread to the lips, the tongue, the palate, or the tonsils. A marked glandular swelling accompanies ulcero-membranous stomatitis; the submaxillary glands, especially on the left side, are hard and painful on pressure, but they rarely suppurate.

In a study of an epidemic among soldiers Bergeron observed a period of incubation and one of invasion, which are difficult to recognize in children. In the latter the first symptoms are profuse salivation, a fetid gangrenous odor of the breath, and pain and discomfort in mastication which lead the little patients to refuse food. The saliva is neutral or alkaline in reaction. The temperature of the buccal cavity is elevated, exceeding 37.5° and sometimes reaching 39° (99.5° and 102° F.). There are also infectious forms in which the

temperature may rise to 40° (104° F.), and in which there will be depression and delirium.

In the child these general symptoms are usually less pronounced than in the adult, the local symptoms attracting the most attention. The distaste for food is due chiefly to the mechanical interference with the masticatory movements. When the disease is properly and promptly treated recovery will take place in eight or ten days; but when untreated it may last much longer and be complicated by suppurative adenitis, secondary infections, etc. Recovery is the almost universal rule, and I have never seen a case of fatal ulceromembranous stomatitis among all the children treated in hospital.

The *diagnosis* is easy. Diphtheria is not ulcerative, its patches are elevated above the surface of the mucous membrane, are well defined and more adherent than the necrotic débris found in ulceromembranous stomatitis. Gangrene of the mouth (noma) is a deep lesion involving the entire thickness of the cheek, always burrowing, and extending down to the bone. Simple ulcerative stomatitis is more limited, there is less exudation, it is less commonly accompanied by adenitis, and it is not contagious. Aphthous, impetiginous, or herpetic ulcers are superficial, limited, not specially located on the gums, and unaccompanied by fœtor of the breath or adenopathy. The ulcerations of varicella are rounded, superficial, evanescent, and without gravity.

The *treatment* of this affection is extremely simple. Chlorate of potassium, internally and externally administered, is the specific remedy. From fifteen to thirty grains of chlorate of potassium in a mucilaginous mixture may be given internally, and at the same time local applications may be made of a four-per-cent. solution in water. If the disease is especially rebellious to treatment we may touch the ulcers with tincture of iodine, either pure or diluted with glycerin, with permanganate of potassium, 1:200, or with a 1:1,000 sublimate solution. The child should be fed on boiled or sterilized milk, and should be isolated until recovery is complete.

Aphthous Stomatitis.

Aphthæ, a rare affection at all ages, is manifested by ephemeral vesicles which become eroded and give place to rounded ulcers of the tongue, the palate, and the internal surface of the lips. These ulcers are more regular in shape and smaller than those of ulcerative stomatitis, and resemble closely herpetic ulcers. Around them the mucous membrane is red and swollen, and the saliva, which may be acid or neutral in reaction, flows constantly. At the same time the tongue is coated, there is fever, diarrhœa is present, and the general condi-

tion may be serious enough to interfere with sleep, disturb the appetite, etc. Recovery is, however, the rule.

The *diagnosis* is not easy, and the mistake is almost always made of taking simple herpes of the mouth for aphthæ. We must take into account not only the objective characters of stomatitis, but also the facts which can be gleaned concerning the source of the milk.

Treatment.—Aphthous, like ulceromembranous stomatitis, is to be treated by applications of a solution of chlorate of potassium or by antiseptic solutions (boric acid, 3 per cent.; borax, 5 per cent.; or salicylate of sodium, 10 per cent.). It has been said, and not without reason, that aphthous stomatitis of nurslings is a bovine disease transmitted by the milk of cows affected with "cocotte" (aphthous fever). A number of convincing facts have been cited in support of this theory, although the aphthous fever of children differs from that of cows by the absence of the exanthem (vesicles on the legs and teats). To prevent aphthous stomatitis, therefore, we must forbid the use of milk from sick cows; and, furthermore, we should never permit infants to drink raw milk, only boiled or sterilized milk.

Herpetic Stomatitis.

Herpes of the buccal mucous membrane is very common in children. It may exist alone or may be accompanied by herpes of the lips, face, or throat. It occurs in the form of little, rounded erosions, grouped to the number of four to ten on the tongue, palate, and internal surface of the lips. These ulcers, which are minute and punctiform, may by coalescing form large irregular plaques of a diphtheritic appearance. Around them we find more or less inflammation, stomatitis, with its symptoms of redness, swelling, salivation, and difficulty in eating. The fever is rather high in the beginning, but falls rapidly later. The infant is restless and fretful, and refuses the breast.

The herpetic is the most common of all the forms of stomatitis, and is not readily distinguished by its objective features. It resembles aphthæ and impetigo, but if there is a group of herpetic vesicles on the lips or elsewhere, the diagnosis will be comparatively easy.

The *treatment* is the same as that of other forms of stomatitis.

Impetiginous Stomatitis.

This form of stomatitis results from the localization in the mouth of the impetigo contagiosa of Tilbury Fox. We may sometimes observe the passage from facial to buccal impetigo, one of the pustules being observed astride the mucocutaneous border of the lip. From this point the pustules may invade the gums or the tongue;

they are more extended, more irregular in outline, deeper, and more diphtheroid in appearance than the ulcers of aphthæ or herpes. They are also more discrete, less numerous, and more localized, seldom passing the vestibule or at most the anterior half of the mouth, and do not invade the pharynx.

We may sometimes hesitate in forming a diagnosis if we are unable to discover other staphylococcal manifestations, such as impetigo of the face, paronychia, vesicular conjunctivitis, etc. The disease is contagious.

In a paper read before the Clinical Society of Paris in 1887, I insisted upon this as a distinct form of stomatitis, and the later researches of Sevestre and Gaston confirmed my clinical inductions by the demonstration of the presence of the staphylococcus aureus in the exudate of this form of stomatitis.[11]

Although the exudate of this form of stomatitis resembles that of diphtheria, it is not so thick or so adherent. It is claimed, however, that the staphylococcus may give rise to the formation of false membranes similar to those of the Klebs-Loeffler bacillus, both in the buccal cavity and in the throat.

Impetiginous stomatitis is not of itself a grave disease, but is observed rather frequently in children who have been weakened by measles, whooping-cough, or bronchopneumonia, and it may be the means of entrance of secondary infections.

It should be treated antiseptically by means of lotions of chlorate of potassium 5 per cent., corrosive sublimate 0.1 per cent., or permanganate of potassium 0.2 per cent.

Gangrenous Stomatitis.

Noma or gangrene of the mouth is without question the most severe form of stomatitis occurring in childhood; it is happily at the present day very rare, being prevented by an improved hygiene.

Etiology.

Noma is a secondary infection occurring in those debilitated by some previous disease, such as measles, scarlatina, typhoid fever, or hospitalism. Measles is the disease which most frequently precedes the occurrence of noma. Children who are neglected, badly nourished, and weakened by poverty or disease present a field all prepared for gangrene.

From the mouth, where it takes its origin, noma may extend until it reaches the throat, the lungs, or even the external genital organs.

Schimmelbusch, of Cologne, in a case of a girl of five years suffering from noma following an attack of typhoid fever, found in the gangrenous part a bacillus with rounded extremities, which he succeeded in cultivating, but obtained no results from inoculation. Babes and Zambilovici[12] found a very slender bacillus which could be cultivated in bouillon and which caused gangrene when inoculated into rabbits. Apart from the results of such bacteriological investigations, however, the infectious nature of noma is very evident.

Pathological Anatomy.

Inspection shows a thick eschar occupying the whole of the cheek and possibly invading the pharynx, denuding the maxillary bones and resulting in their death. If the eschar is detached we see an enormous cavity disfiguring the child; if it is still adherent the neighboring parts are infiltrated with a serous effusion and with leucocytes. The vessels in and about the gangrenous area are obliterated by clots and the thickening of their walls. In children who have died from the disease we often find a secondary bronchopneumonia or even pulmonary gangrene. The gangrenous process which has begun in the interior of the mouth passes through the tissues of the cheek, and by means of progressive obliteration of the vessels extends in all directions.

Symptoms.

The first sign of noma is a grayish patch on the inner surface of one or the other cheek in a child weakened by some previous disease, such as measles, whooping-cough, scarlatina, or typhoid fever. On palpation we feel a deeply seated indurated nodule beneath the superficial patch. This nodule is not strictly defined and gradually invades the neighboring tissues. The child feels no pain, and the progress of the disease is very insidious. In some cases it is not in the cheek but in the lip or the gums that the affection begins. Soon there is a putrid discharge which infects the saliva and imparts a horrible odor to the breath.

As the disease progresses the teeth become loose and fall out, after recession of the gums. Grayish and sanious sloughs hang down into the cavity of the mouth or perhaps pieces of bone become detached. The saliva, which is abundant and fetid, flows incessantly from the mouth. Sometimes the external surface of the cheek becomes blackish, covered with blebs, and ulcerated. A grayish line marks the limits of the eschar, which will be detached later if the child lives long enough. Then a sharply cut cavity forms, which

may, however, cicatrize, the child then recovering. Associated with these local symptoms, which are horrible to see, we find very alarming general symptoms. The face is pale and earthy-looking, the physiognomy is sad and depressed, the pulse is small and frequent, fever is present, the skin is dry, the child has anorexia, excessive thirst, and putrid diarrhœa. Death, which frequently terminates the scene, occurs at the end of one, two, or even three weeks, but may be hastened by the intercurrence of a bronchopneumonia.

Prognosis.

Recovery takes place about one time in four, when the gangrenous area is limited in extent and the child is robust. The remains of the disease, if recovery takes place, are sad enough; there are lost teeth, horrible and discommoding cicatrices, necrosis of the bones, and salivary fistulæ. The prognosis, in a word, is bad whether for life or for subsequent happiness.

Diagnosis.

We differentiate noma from ulceromembranous stomatitis, with which it was formerly confounded, by the appearance of the initial ulceration, which is single, is accompanied by induration of the cheek, by sloughing, by a fetid odor, etc. Malignant pustule, when located on the cheek, resembles noma; but it begins externally on the skin, and the history will be that it has followed the bite of an insect or some injury.

Treatment.

Noma must be attacked energetically. The gangrenous area should be isolated by means of the thermocautery and its edges sterilized in order to arrest its progress. At the same time the mouth must be freely irrigated by antiseptic solutions of sublimate or of permanganate of potassium, 1:1,000. The child must be fed with milk, cream, and scraped beef. His strength must be kept up by cinchona and alcohol. Solutions of creosote or of eucalyptus should be sprayed in the apartment.

In order to prevent the occurrence of noma sick children, especially in hospitals, should be placed under the best hygienic conditions; they should be in large, well-ventilated, and absolutely clean rooms, should be fed on nourishing food, and the buccal, nasal, and pharyngeal cavities should be systematically cleansed with antiseptic fluids. Since these precautions have come to be universally taken noma has almost entirely disappeared.

DISEASES OF THE PHARYNX.

Herpetic Angina.

Herpetic angina, like herpetic stomatitis, is merely a localization of febrile herpes, herpetic fever, a malady the nature of which is not yet understood but which results perhaps from an infection, perhaps from autointoxication through the exciting influence of cold, fatigue, or indigestion.

Symptoms.—The child is seized suddenly with fever, a sense of fatigue, more or less violent headache, depression, and unusual somnolence, and soon after he complains of a pain in the throat with difficulty in swallowing. Direct examination, if made at the beginning of the illness, shows us several opaline vesicular points in the midst of a red surface at the isthmus of the fauces. These little vesicles, which are usually located on the tonsils, are soon broken and leave in their place a whitish exudate, more or less numerous spots, which during the following days form patches resembling diphtheritic false membranes. This is the diphtheroid angina, the *angine couenneuse* of Trousseau. But what distinguishes the herpetic from the diphtheritic false membrane is the absence of the Klebs-Loeffler bacillus.

If there should happen to be at the same time a buccal, facial, or labial herpetic eruption, the diagnosis could be made at once, without the bacterioscopic examination. The fever which is quite pronounced at the beginning falls on the third or fourth day, and recovery is rapid, although the pain as well as the angina may persist for eight or ten days.

Diagnosis.—The delicate and important question is to distinguish herpetic angina from diphtheria. The first has a more sudden and noisy onset, the fever is higher, although ephemeral; there is little or no glandular enlargement. The onset of diphtheria is much quieter and more insidious. But whatever the clinical appearances, we should always, if possible, make a bacterioscopic examination.

Treatment.—However benign herpetic angina may be, we ought never to neglect it. At the beginning an emetic (seven grains of ipecac) or a purgative (half an ounce of castor oil) may be given. The child should gargle the throat with barley water and milk. The only food allowed should be milk. The throat should be irrigated or sprayed with a solution of boric acid. If the fever is high we may give quinine in the form of suppository or enema, four to eight grains of the hydrochlorate.

Simple or Catarrhal Angina.

Without speaking of the catarrhal and secondary anginas (scarlatina, grippe, typhoid fever), there is an acute primary sore throat, sometimes simple and devoid of gravity, sometimes infectious and possibly complicated with albuminuria, pleurisy, or endocarditis. The infection occurs through the tonsils, lymphoid organs imperfectly protected by a frail epithelium which allows of the passage of microbes, the advance of which is not always arrested by the phagocytes. Sometimes this infection of the tonsils is manifested externally by a marked glandular enlargement—glandular fever.

The invasion is sudden and severe; the child is seized with fever, sore throat, a feeling of fatigue, and anorexia. An examination of the pharynx shows redness, which is sometimes masked by a whitish or grayish creamy-looking exudate which is soft and easily removed. At the same time mucopurulent streaks may be seen on the posterior wall of the pharynx. The pultaceous exudate on the tonsils is formed of epithelial débris, leucocytes, and microbes, especially streptococci which are found in the erythematous forms as well as in the phlegmonous (Veillon[13]). The urine is red, scanty, charged with urates, and sometimes albuminous (Bouchard). The fever which is often very high may be accompanied by vomiting, restlessness, and delirium.

The duration of the disease is short, five to eight days at the most, but this period may be prolonged if suppuration takes place (phlegmonous angina). The prognosis is good except in the rare cases which are complicated by nephritis, endocarditis, or the like.

In the *treatment* we should insist upon the patient remaining in bed or at least in the room, and we may give a purgative or an emetic; we may prescribe emollient gargles or antiseptic irrigations, and the child should be placed on a milk diet.

Phlegmonous Angina.

This form is but a step beyond the preceding, which it may follow. The microbes which have passed the epithelial barrier do not always remain confined to the surface; the afflux of leucocytes may be insufficient and suppuration will take place under the mucous membrane or in the substance of the gland (tonsillar or peritonsillar abscess). The tonsil becomes enlarged, hard, red, and painful. The child has dysphagia and trismus, being scarcely able to separate the teeth. The abscess usually breaks on the seventh or eighth day.

The inflammation may extend to neighboring parts, causing œdema of the glottis.

Treatment.—When the pain is atrocious and the suppuration very evident we make an incision and wash out the cavity with antiseptic solutions. After the pus has once been let out, recovery is usually prompt.

Gangrenous Angina.

Gangrene of the throat is very rare in children, but may occasionally occur as a complication of diphtheria or scarlatina or as a sequel of noma. It never occurs as a primary condition in healthy and robust children, but is a growth on a soil exhausted by cachexia.

The tonsils are seen to be deeply ulcerated, with torn edges, and of a blackish color; there is a fetid sanious discharge which imparts a disgusting odor to the breath. After the eschar has been detached we see an extensive and deep loss of substance which later becomes covered with fleshy granulations. From its point of origin in the tonsils the gangrene may spread to the velum or pillars of the palate, or to the uvula, or may ulcerate into the large vessels, carotid artery or jugular vein, causing death by hemorrhage.

The *prognosis* is very grave. The child, poisoned by absorption from the gangrenous eschars, becomes exhausted; he utters no complaint, but he is pale, adynamic, and in an almost syncopal state.

Treatment.—The throat must be carefully disinfected by means of generous irrigations with solution of permanganate of potassium or of Van Swieten's liquor. The strength must be maintained by milk, alcohol, quinine, and nutrient enemata containing peptones.

Retropharyngeal Abscess.

This is an affection of comparatively frequent occurrence in infants. The abscess may be "cold," arising from a bony lesion, cervical Pott's disease, or "hot," resulting from a streptococcal or staphylococcal infection.

Etiology.

Puny, ill-nourished, bottle-fed children are more exposed to this affection than are breast-fed children. We know that behind the posterior wall of the pharynx there are lymphatic glands receiving the lymphatic vessels from the pharyngeal mucous membrane, and the abscess follows most commonly a true adenitis, the point of departure of which must be looked for upon the surface of the adjacent

mucous membrane. This retropharyngeal adenophlegmon is usually a sequel of some general affection having a pharyngeal localization, such as measles or scarlet fever.

Symptoms.

The seat of the abscess is variable and may be in the upper, median, or lower part of the pharynx; the median location is the most common, the abscess being seen forming a projection behind the base of the tongue when the mouth is open. The abscess, when left to itself, may open spontaneously, recovery then ensuing; but it may also pass down along the sides of the pharynx, sometimes even entering the mediastinum.

The early symptoms of deep suppuration in the throat are insidious and latent, dysphagia or suffocation being often the first sign of its presence. An observant mother may notice a little stiffness of the neck when the child is put to the breast, and also that he nurses greedily but rejects the milk almost immediately through the nose; there may also be stiffness of the jaws (trismus). When the abscess is situated far enough down to obstruct the entrance of the larynx there will be dyspnœa which may be accompanied by a whistling, croupy respiration, suggesting œdema of the glottis or croup. There may even be attacks of actual suffocation.

None of these symptoms is characteristic and only a direct examination of the pharynx will enable us to form a definite opinion. When the child's mouth is held open by a tongue depressor we see that the posterior pharyngeal wall bulges forward so as perhaps to touch the velum palati and close the isthmus of the fauces. If the abscess is situated very high it may not be visible but can be felt with the finger. Palpation with the index finger will reveal the presence of the tumefaction, its extent, its form, and its consistence. If the case is acute and infectious we find fever, depression, and a tendency to syncope. In subacute or chronic cases the abscess may cause no very severe symptoms, and instances have been observed in which retropharyngeal abscesses remained with little change for several months.

Prognosis.

The disease is serious, especially when it is not recognized and consequently not treated at the proper time. Although the abscess may open of itself and heal, it may also occasion grave and even mortal complications, opening into the larynx, migrating to distant parts, or ulcerating into the great vessels. The child may die suddenly from asphyxia or syncope, or may succumb from inanition.

Diagnosis.

The affection may easily be recognized by sight or touch, but in order to arrive at a diagnosis it must first have occurred to us to examine the throat of a child who is too young to speak or to complain in such a way as to draw attention to the seat of the trouble. The examination will enable us readily to distinguish postpharyngeal abscess from croup or œdema of the glottis.

Treatment.

The treatment of retropharyngeal abscess is purely surgical. A bistoury, guarded throughout most of its length by adhesive plaster, should be plunged boldly into the most projecting part of the abscess back to the vertebral column. Immediately there will be a gush of pus into the mouth of the child, whose head must be at once pressed forward so as to prevent the entrance of pus into the larynx. In order to avoid this accident it has been recommended to open the abscess with a trocar and cannula. After the abscess has once been opened recovery is usually prompt. If the pus should again accumulate we must incise again and favor complete evacuation by means of antiseptic irrigation of the cavity made through a catheter.

The opening of the abscess from the outside by an incision behind the sternomastoid muscle, which has been recommended by certain surgeons, is only very exceptionally indicated in acute cases; it might, however, be justifiable in the case of a chronic abscess pointing externally. Opening through the mouth, however, remains the operation of choice (Rochard[14]).

Hypertrophy of the Tonsils.

The tonsils lying between the pillars of the fauces are collections of lymphatic follicles held together by a connective-tissue stroma. In addition to these collections the follicles are disseminated or grouped at the base of the tongue, on the posterior wall of the pharynx, and in the nasopharynx. We may say that the pharynx is studded with adenoid tissue, and the chronic anginas of children have their anatomical basis in hypertrophy of this lymphoid tissue of the pharynx.

Etiology.

Hypertrophy of the tonsils is an affection peculiar to childhood. Lymphatic, strumous, and arthritic children are predisposed to it, but even the most healthy and vigorous are not always immune. In

the first years of life, indeed, lymphatism is, so to say, the normal condition, and may be regarded as an affection of evolution, as a transitory morbid temperament which will disappear later. Acute inflammations, colds, or simple sore throats irritate the lymphoid tissue, favor its proliferation, and lead gradually to hypertrophy of the tonsils.

Pathological Anatomy.

Two things are to be noted in chronic tonsillitis or tonsillar hypertrophy, namely, a considerable increase in the reticular tissue of the follicles and an increase of the submucous and interstitial connective tissue. The mucous membrane which is stretched by the underlying hypertrophied tissues is smooth, and the tonsil also seems to be smoother, presenting less of a mulberry appearance; the mucous chorion is thickened by a growth of fibrous tissue, a true sclerosis which fills up the depressions or crypts of the tonsil. The epithelium is normal. Beneath the mucous membrane we see connective-tissue bundles compressing the vessels (perivascular sclerosis). In a word, hypertrophy of the tonsils is a chronic inflammation with sclerosis.

Symptoms.

When the child opens its mouth we see the isthmus of the fauces obstructed laterally by two rounded mulberry-shaped masses which may approach each other so far as even to touch, pushing back the uvula and separating the pillars. The surface of these masses is smooth, of a pale pink color with scarcely visible crypts. In the adult we often, however, see deep clefts filled with caseous material. Behind these large and prominent tonsils, which appear sometimes to be pedunculated and expressed from their normal seat, we see the red pharynx, uneven and covered with mucus.

The child has the tonsillar facies, mouth half open, especially during sleep, face pale, with emaciation and short breath on the least exertion. Dupuytren believed that hypertrophy of the tonsils interfered with the development of the child by preventing the entrance of air and the free play of the thorax.

One common symptom is a dry, difficult, croupy cough, occurring most commonly in the night or morning, having a cavernous sound which causes alarm to the parents, and perhaps accompanied by nausea and vomiting. With this we find marked dysphagia, partial deafness, a nasal tone to the voice, a certain degree of dyspnœa with whistling respiration, and snoring during sleep.

Hypertrophy of the tonsils is an essentially chronic disease, but

is liable to acute exacerbations which increase the sufferings of the children and cause still greater enlargement of the glands. It is, however, curable.

Treatment.

The therapy of tonsillar hypertrophy consists in general and local measures. By the first we seek to increase the nutrition of the child and combat the lymphatic temperament by an open-air life in the country or at the seashore, and by a course of saline and sulphur mineral waters. We should prescribe cod-liver oil, syrup of the iodide of iron, etc.

Locally we may try to reduce the tonsils by astringent applications, as of alum, borax, or tincture of iodine, and by punctate cauterizations by means of the thermo- or galvanocautery.

The preferable mode of treatment, however, is extirpation which may be effected by means of the bistoury or the tonsillotome. Before operating we must assure ourselves that the child is not at the moment suffering from an acute exacerbation of tonsillitis, and we must not forget the necessity of antiseptic precautions, such as irrigations or applications of solutions of sublimate (1:1,000), salicylic acid (1:500), or carbolic acid (1:200). The operation opens a door by which infection may enter unless especial antiseptic precautions have been taken, as in a case reported by A. Caillé[15] in which diphtheria appeared in the wound and thence spread to the pharynx.

Another danger of tonsillotomy is hemorrhage, which is sometimes alarming, and may even be fatal, especially in "bleeders." Before operating, therefore, we should inquire into the family and personal history to assure ourselves of the absence of hæmophilia. In order to avoid hemorrhage we may amputate the tonsils with the galvanic snare. This, however, necessitates a special apparatus.

Chronic Catarrhal Pharyngitis.

Chronic inflammation of the isolated follicles on the posterior wall of the pharynx is not rare in infancy; it is often a sequel of acute nasopharyngeal catarrh, frequently repeated or become chronic, as manifested by a nasal voice, a dry cough, and especially by a mucopurulent discharge running down the wall of the pharynx.

Etiology.

Even when the etiological condition just mentioned is absent, we find that almost all children have a number of little projecting granules, from the size of a pea to that of a bean, on the lower part of the

posterior pharyngeal wall, which result from an hypertrophy of the closed follicles (granular or glandular pharyngitis, granulations of the throat).

Hereditary anæmia, lymphatism, scrofula, tuberculosis, and arthritism are often seen in children who have these pharyngeal granulations, but it should be remembered that the majority of such children are seemingly perfectly healthy. Furthermore, all children, apart from any hereditary influence, are lymphatic in temperament and exposed by the sole fact of their age to hypertrophies of the isolated or agminated follicles (hypertrophy of the tonsils, granulations, adenoid vegetations), which may be regarded as diseases of evolution.

We do not find in the child the causes of irritation of the throat (alcohol, tobacco, vocal fatigue) which produce the granulations occurring in the adult, but in exchange for this he has adenoid vegetations, deviations of the nasal septum, turbinated hypertrophy, and chronic coryza which obstruct the nasal passages and force him to breathe through the mouth; thus there reaches the pharynx an irritating air, that is to say air which has not been warmed or filtered from the dust with which it is always charged.

Symptoms.

Many children have granulations in the pharynx without making any complaint or experiencing any unpleasant symptoms whatever. Others complain of dryness of the throat and pain in swallowing, and have a troublesome cough occurring at night rather than in the day, in the morning rather than in the evening. They wake with a distressing sensation of heat and thirst, the appetite is reduced, and they are pale and anæmic. The voice, which is often clear, may be rough, hoarse, and broken. The tonsils are usually larger than normal.

The posterior wall of the pharynx is uneven, mammillated, seamed, dry in one place and covered with a mucopurulent discharge in another. The surface is marked by rounded projections occurring singly and irregularly disposed in lines, triangles, or quincunxes. The mucous membrane around these granulations is red and vascular. This condition, essentially chronic, may last a very long time; but it is without gravity and does not deserve the violent attacks which some physicians make upon it.

Treatment.

The treatment is general and local. The general tone of these children is to be brought up by cod-liver oil, good food, a life in the country or at the seashore, or the use of sulphur, saline, or arsenical

mineral waters. Locally we may make applications of tincture of iodine or destroy the granulations with the galvanocautery. In order to modify the nasopharyngeal catarrh we may use a spray of a sulphur mineral water, such as that of Challes or of La Bassère, or nasal instillations of mentholated oil (1:40), two or three drops being put into the nostrils night and morning.

Adenoid Vegetations.

Without trespassing too much upon the domain of the specialists who have monopolized this affection, I must say a few words concerning it because of the frequency with which it is encountered in children and of the relations which it bears to preceding morbid states.

Etiology.

The lymphoid tissue in the upper part of the pharynx takes on a considerable growth in certain scrofulous, tuberculous, syphilitic, or degenerate children. It sometimes becomes hypertrophied as a sequel of an attack of measles, scarlatina, or whooping-cough in children who are free from all hereditary taint.

Pathological Anatomy.

The microscopical lesions are the same as those in hypertrophy of the tonsils or of the isolated closed follicles. Sometimes Koch's bacilli have been found in the vegetations, and tuberculosis may be engrafted upon them. The lymphoid masses are more or less voluminous; when very large they may close the posterior openings of the nasal fossæ and the Eustachian tubes, thus preventing entrance of air into the nasal fossæ and middle ear.

Symptoms.

The little patient with adenoids has a special physiognomy. The mouth is constantly half open, the face is pale, the respiration is difficult and noisy, especially during sleep which is never tranquil. The appearance of the child is somewhat idiotic. In consequence of the dryness of the throat and larynx, the patient is exposed to attacks of stridulous laryngitis. The hearing is often affected and the children are frequently brought to consult the physician because of otitis, otalgia, or deafness. The voice is nasal in tone. The child is pale and anæmic by reason of defective hæmatosis, and is subject to colds.

The palatine vault is high, the upper maxillary bone is promi-

nent; in some cases a narrow chest has been observed, and there is sometimes arrested or retarded development. All these are symptoms which may lead us to suspect adenoid vegetations.

Diagnosis.

In order to be sure of the diagnosis, however, we must feel the vegetations with the tip of the finger or see them in the rhinoscopic mirror. By one or the other means we demonstrate the existence in the vault of the pharynx of soft, irregular fungous masses which more or less block up a cavity which ought to be empty.

Treatment.

When once a diagnosis is made we must operate for the removal of these vegetations, which expose the child to serious dangers and untoward complications; they are the source of anginas and repeated attacks of laryngitis or bronchitis, they menace the hearing, they interfere with the respiratory functions, with hæmatosis, etc. There is, however, a question of degree and of measure. There is perhaps too great a tendency to operate on children who have only abortive vegetations and who might recover spontaneously as they grow older.

When the vegetations are voluminous, however, it is necessary to extirpate them. Three methods of accomplishing this object have been proposed: 1. Scraping with the finger, a blind, imperfect, and painful procedure, in which asepsis is hardly possible. 2. Galvanic cauterization, which requires numerous sittings and is not easily performed. 3. Ablation by means of special forceps with long blades and a cutting end. The last-named method is the one preferred by specialists. Anæsthesia by bromide of ethyl is usually necessary, although some surgeons do not regard this as indispensable, the operation being quite simple and rapid. Great care, however, should be observed to maintain antisepsis before and during operation.

Drs. Castex and Malherbe[16] have shown that the little patients, who before the operation were pale and languishing, develop rapidly once they have been freed from the vegetations, the post-operative rate of growth being three times the ordinary rate.

Marage[17] has claimed that medical treatment was all-sufficient, having obtained a cure in a number of cases by touching the vegetation with a fifty-per-cent. solution of resorcin in water, the application being repeated every two or three days; a cure was obtained at the end of six or eight applications.

DISEASES OF THE ŒSOPHAGUS.

Diseases of the œsophagus are very rare in children if we regard them independently of other lesions to which they may be secondary. Catarrhal pharyngitis, diphtheria, and thrush may invade the œsophagus, a retropharyngeal abscess may work down and become a retroœsophageal abscess, or pus coming from cervical caries of the spine may push forward and inflame or perforate the œsophagus. All these lesions, however, are secondary and need not be considered here. It is sufficient to say that in all diseases of the mouth or of the throat we must remember the possibility of a propagation to the œsophagus. In case of thrush, for example, when we notice a marked difficulty in swallowing we may assume that the œsophagus has been invaded and may treat the extension of the disease by means of alkaline drinks, such as lime water or Vichy water. The affections which we shall now consider are those which possess a certain independence, namely, œsophagism, œsophagitis, stricture, and foreign bodies.

Œsophagism.

We sometimes observe very persistent and distressing œsophageal spasms in children of nervous temperament, the issue of hysterical, epileptic, alcoholic, arthritic, or insane parents. I have seen two remarkable cases of this kind.

The first case was that of a boy fourteen years old who had pain and difficulty in swallowing, of liquids rather than of solids, and regurgitation. The first thought was of true stricture of the œsophagus, although the boy had never swallowed any hot or caustic liquid which might have caused a cicatricial stenosis of the tube. The passage of a sound showed that there was no organic and permanent obstacle and that spasm alone hindered the progress of food. Treatment by means of bromide of potassium, hydrotherapy, etc., was of no avail. The child has become a man and is now thirty years old; he suffers less from the spasms than formerly, but still has more or less marked dysphagia, especially when drinking. The patient's mother was of a nervous temperament, and his father had died of tuberculosis; the mother's parents were gouty and melancholic; in short, there was an arthritico-nervous heredity.

The second patient was a girl of seven years, the daughter of a very nervous mother, who had œsophagism in relation to solid substances. The passage of a sound showed that the stricture was purely spasmodic. This child when I saw her had another nervous

stigma, namely, profuse sweating of the hands and feet without any fetor.

Œsophagism may appear suddenly upon the occasion of some strong emotion, a fright, or the swallowing of some irritating fluid or highly spiced food. In my first case the spasm showed itself after the ingestion of a salad dressed with very strong vinegar.

In the case of a girl of twelve years observed by Haushalter the œsophagism began suddenly after a strong emotion. Spasm in this case existed only for saliva and for fresh fruits. The child was hysterical and was cured by suggestion.

We must treat these patients as we do those of nervous temperament, by means of cold douches and by bromide of potassium internally, isolating them if necessary, and perhaps making use of hypnotic suggestion.

Œsophagism is only a sort of local hysteria, a visceral hysteria. It is of no special gravity, that is to say, life is not threatened, but in some cases the disease shows itself very rebellious to treatment.

Acute Œsophagitis.

Acute spontaneous inflammation of the œsophagus is never an isolated affection; it may occur through propagation of a bacillary pharyngitis, of thrush, of ulcerative stomatitis, or of diphtheria.

It may be induced by the accidental introduction of something which causes irritation by its heat (boiling water), its chemical properties (acids or caustic alkalies), or its size (foreign bodies).

The only symptoms of œsophagitis are dysphagia and pain; the food can be swallowed only with difficulty and its passage causes pain, or it may be regurgitated. This dysphagia is due to the fact that the mucous membrane is swollen, ulcerated, and covered with inflammatory exudates, false membranes, deposits of thrush, etc. When the œsophagitis results from the lodgment of a foreign body the inflammation may terminate in the production of cicatrices causing stenosis of the tube.

When acute œsophagitis is present we must prescribe liquid diet, especially milk which acts as an emollient topical application as well as a food. Lime water or Vichy water may be added to it to render it more alkaline.

Stricture of the Œsophagus.

Stenosis of the œsophagus may be congenital and due to an arrest of development; it is then situated in the upper third of the tube. It may be accompanied by diverticula forming pockets in which food accumulates.

Acquired stricture is due most frequently to the accidental ingestion of a caustic fluid, especially caustic potash. The mucous membrane of the œsophagus attacked by the caustic liquid sloughs and the resulting cicatrix causes stenosis of the tube. There are two stages of unequal duration, the first inflammatory, and the second cicatricial and obstructive. At the beginning we find severe pain with impossibility of swallowing anything whatever, attempts at vomiting, and salivation. Later the passage of fluids is possible, but solids are swallowed with the greatest difficulty; the dysphagia is progressive. The sound when introduced is arrested by some organic obstruction. Children suffering from stenosis of the œsophagus become emaciated and marasmic.

The treatment must vary according to the case. We may at first attempt slow and progressive dilatation by means of olive-pointed bougies. If the stenosis is impassable we must resort to electrolysis, to internal or external œsophagotomy, or, as a last resort, to gastrotomy, which will enable us to introduce food directly into the stomach or perhaps to perform retrograde catheterization of the œsophagus. This operation gave good results in the case of a child of four years and a half reported by Monnier.[18]

Foreign Bodies in the Œsophagus.

Children, by reason of their gluttonous swallowing of unmasticated food or of various objects, such as coins, are more exposed than adults to the arrest of foreign bodies in the œsophagus. Among such bodies have been found needles, pieces of bone, fish bones, stones, pennies, and various toys. All these bodies have a tendency to stop at one of three points which are normally narrow, namely, the superior and inferior orifices, and the point where the aorta crosses the tube. When they have roughened surfaces they may be arrested at any point and may then cause inflammation, abscesses, and subsequent stenosis.

At the beginning the patient suffers from pain, anxiety, and attempts at vomiting; the face is red, the eyes are swollen, and sometimes there are convulsions; there may also be reflex troubles on the part of the respiratory organs, such as dyspnœa, cough, and aphonia. Deglutition becomes difficult or impossible. Later the pain becomes fixed at one point. A suppurative inflammation may follow and the pus may burrow into neighboring parts, such as the mediastinum, the bronchi, the pleura, or the pericardium, and may cause hemorrhage.

We must not confound foreign bodies of the œsophagus with

those in the air passages. Exploration by means of the finger or of an olive-pointed bougie, and laryngoscopic examination will furnish data upon which to base the diagnosis.

The prognosis varies. Sometimes the foreign body is spontaneously rejected or may be easily extracted; when recovery will immediately follow; sometimes it becomes encysted and may cause asphyxia or inflammatory reaction.

An attempt may be made to push the body into the stomach by means of the ingestion of thick soups or of mashed potatoes, and then to cause its expulsion by the exhibition of an emetic. If this fails an attempt may be made by some one of the various instruments in use to extract the foreign body. Sometimes it may be necessary to resort to external œsophagotomy.

After the foreign body has left the œsophagus it will pass through the stomach and intestines more slowly than alimentary substances. Revilliod [19] noted the time of passage through the intestines of the foreign body in three cases occurring in children of ten and a half, eight, and four years respectively; in the first case a cylindrico-conical body 3 cm. long by 8 mm. wide, weighing 14½ gm., was passed at the end of fifty-five hours; in the second a sou (about the size of an old-fashioned copper cent) was passed in a hundred and twenty-two hours; in the third case a coral bead weighing 5 gm. was passed in ninety-six hours.

DISEASES OF THE STOMACH.

These affections are very common in infancy in consequence of the functional activity of the stomach at this period and of the hygienic abuses to which it is submitted.

Infantile Dyspepsia.

A nursing child is said to be dyspeptic when it suffers from vomiting, abnormal alvine discharges, distention of the abdomen, borborygmi, etc.

Etiology.

In well-regulated breast-feeding there is no dyspepsia. Without doubt if the nurse has too much milk, or if the milk is too old or contains too much casein or fat, or if the periods of nursing are too frequent, the child may have indigestion or vomiting, colic, lienteric or bilious diarrhœa, or constipation. In such a case a correction of the fault which causes the trouble will put an end to the dyspepsia; sometimes it will be necessary to change the nurse unless she lives

more hygienically, regulating her diet, reducing the quantity of, or abstaining entirely from alcoholic liquors, etc.

A faulty alimentation is the main cause of dyspepsia, and we need not be astonished to learn that of three hundred and forty-one dyspeptic children seen at Leicester only two per cent. were breast-fed. It is difficult to see how this could be otherwise; when breast-fed the new-born finds the food which nature intends and has prepared for it and to which its organs are adapted in advance, but in artificial feeding it receives a different kind of food, a milk which is often watered, soured, or tainted, and the child receives it in excessive amount. The capacity of a child's stomach is very small, 50 c.c. at birth, 100 c.c. at one month, 250 c.c. at five months, and 400 c.c. at nine months. This fact is too often forgotten by those who give little children a few months old quarts of liquid to ingest. In addition to his overfeeding there is often poisoning, an infection to which artificial feeding opens the door. Vaughan found a ptomaïn in the milk in a nursing-bottle.

Symptoms.

Among the chief symptoms of dyspepsia of nursing children is vomiting, which may be alimentary, mucous, bilious, or bloody. The vomiting is often preceded by hiccough, eructations, and nausea. The child suffers from colic and meteorism; there may be either constipation or diarrhœa.

From the stomach the catarrh invades the intestine, and gastro-intestinal dyspepsia soon takes the place of simple gastric intolerance. The belly is almost always distended and soft or tender according to the case; often we obtain the succussion sound of gastrectasia. Marfan found on measurement that the intestine of children with large belly was longer than that of normal children; thus one of the consequences of overfeeding is a lengthening of the intestinal tract. Abnormal fermentation takes place in the distended and inflamed digestive tube, the toxins are absorbed, and cause functional troubles, such as convulsions, laryngeal spasms, asthmatic attacks, bronchitis, erythematous, urticarial, pruriginous, or eczematous eruptions. Finally dyspepsia predisposes to infectious diarrhæa, cholera infantum, athrepsia, and rickets.

Prognosis.

The gravity of this disease varies according to its cause and intensity. It is slight when the child is breast-fed or when the artificial feeding is properly supervised; but it is grave in cases of unhygienic feeding or premature weaning.

Treatment.

It is above all necessary to prevent dyspepsia by a proper feeding of children, by encouraging breast-feeding, by substituting sterilized milk for raw milk when the child is artificially fed, and by seeing that the nursing-bottles have no tubes. In all cases we must regulate the periods of nursing, separating them by intervals of from two to three hours; we must not allow the children to be overfed or to be weaned too early.

The attacks of dyspepsia may be treated by alkalies (two to three ounces of lime water or Vichy to the quart of milk), by calomel in small doses (one-quarter to one-half grain), by intestinal antiseptics, hydrochloric acid, lactic acid, or creosote. Lavage of the stomach has given good results in some cases; it insures better than any other means intestinal antisepsis, and arrests the vomiting.

In addition to the above-mentioned measures the suppression of milk for half a day or a day may prevent serious consequences. Epstein advised the use of albuminous water until the diarrhœa has ceased, when milk may be again given. Leo has found, by means of lavage of the stomach, that there is an excess of acid in the gastric juice (fatty acids, lactic, acetic, butyric); there may also be an excess of hydrochloric acid. Alkalies are therefore indicated.

Dyspepsia in Older Children (Gastrectasia).

Dyspepsia is frequent in children after weaning; it differs then but little from what it will be later in adolescence or adult life. It almost always has the atonic form, flatulent dyspepsia with dilatation of the stomach. I showed many years ago[20] that dilatation of the stomach was common in children, especially in rachitic children and in those who had been improperly fed in infancy.

Etiology.

Moncorvo, of Rio de Janeiro, wrote in 1883 upon dilatation of the stomach in nurslings, claiming that there was a relation between it and hereditary syphilis and malaria, diseases which are very common in Brazil. There is no question but that these diseases, by interfering with the nutrition of the child, may aid in the production of atonic dyspepsia; but they are not the direct cause, for this resides in the faulty alimentation to which too many children are condemned from their birth. In these cases the dyspepsia of later childhood is a continuation of that which began in infancy. The child, which has ac-

quired the habit of eating and drinking too much, continues to do so, overloading its stomach and intestine. This repeated mechanical distention, whether uncomplicated or associated with gastrointestinal catarrh, is manifested by a distention of the abdomen, tympanites, and diarrhœa or constipation, or an alternation of the two.

The symptoms may vary according to the age of the child and other circumstances, but the essential lesion will persist. The stomach, worn out by continued excess, will for a long time perform its functions imperfectly, and gastrectasia of adult life often originates at this period.

Pathological Anatomy.

Passing over the histological lesions of the mucous membrane, the catarrhal changes, the alterations in the peptic glands, the disturbances in relation to the secretion of hydrochloric acid (hyper- or hypochlorhydria), we would call attention to the thinning of the gastric walls from the excessive distention, and occasionally their softening. In every case in which an autopsy was made on children who had been dyspeptic, in the Hôpital Trousseau during the years 1895-96, I found this dilatation of the stomach and thinning of its wall. I very frequently observed cases in which the lower curvature had descended below the umbilicus or even to the iliac fossa, the organ showing an increase in capacity of one-half, two-thirds, three-quarters, or double the physiological capacity. I found softening of the tunics of the stomach, stagnation and putrefaction of its contents, and erosions and ecchymoses of the mucous membrane. The intestine is at the same time distended, the colon especially being large and dilated. The liver is enlarged and markedly congested.

Symptoms.

Besides the initial troubles, such as vomiting, indigestion, and lienteric diarrhœa, which betray the intolerance and atony of the stomach, we may distinguish two orders of symptoms, the one physical and the other functional.

The physical signs are shown on palpation and inspection. The belly is swollen, there is a separation of the rectus muscles, and in some cases there is a true eventration. Later the swelling goes down, and the abdomen becomes soft and painless on palpation. Percussion gives a tympanitic resonance above the umbilicus in the epigastrium and left hypochondrium. This resonance is clearer than that given by the intestine or the lung, and enables us to fix approximately the limits of the stomach. By means of succussion we may determine the limits of the lower border of the organ. If the child

lies on the back, the abdominal muscles being relaxed, by making light taps on the epigastrium we can elicit clapottement, and the lower down we get it the greater is the dilatation of the stomach. It has been said that gastric clapotage might be confounded with the same sound produced in the intestine. But if we are unable to elicit the sign when the child is fasting, but obtain it immediately after it has taken a little fluid, we may be certain that the sound is produced in the stomach. Bouchard holds that gastrectasia is present when clapotage is heard below the middle of a line drawn from the false ribs to the umbilicus.

The functional symptoms are many and varied. Some children are very tolerant of gastric dilatation and do good work with a bad instrument. That may be called latent gastrectasia. The majority of such children, however, suffer more or less acutely in appetite, digestion, nervous reactions, and general condition. At the beginning the children are polyphagic and polydipsic, and we can never satisfy them. Later the appetite becomes less and is lost, the thirst alone persisting. The children who were formerly large and fat now become thin, pale, and anæmic, digest slowly and painfully, and are very irregular in their bowels. With the diminution of appetite and persistence of thirst the functions of the intestines are disturbed; there is constipation, interrupted from time to time by a discharge of fetid and diarrhœal stools, or by dysenteriform attacks, with glairy mucous stools and melæna. At the same time we note eructation of gas, vomiting, and intestinal and gastric pains.

By reason of the imperfect discharge of the gastric functions and the retention of food until it ferments, assimilation is interfered with, the nutrition suffers, and the child becomes weak, pale, anæmic, short of breath, and easily fatigued, and has palpitations of the heart. His condition is often referred to dentition, worms, rapid growth, or overwork at school, when in reality it is due to dyspepsia. Headache is frequent and sleep is restless and interrupted by sweats, startings, or terrifying dreams. In very nervous children we may observe convulsive movements, tetany.

On the side of the respiratory organs there have been observed signs of an increased bronchial secretion, repeated attacks of bronchitis, and asthmatic paroxysms which often terminate in vomiting.

On the skin we note eczematous eruptions, prurigo, strophulus, urticaria, acne, and seborrhœa.

It has been said that the symptoms are of reflex origin, but I regard them rather as toxic. The dyspeptic child poisons himself incessantly, his stomach is a true laboratory for toxic substances which, absorbed into the general circulation, impoverish the blood and irri-

tate the brains, the lungs, the skin, and the emunctories. Bouveret and Devic found a toxin, which caused convulsions, in the gastric juice of patients suffering from gastrectasia. Oddo and Sarle[21] found indican in the urine of a dyspeptic child suffering from tetany.

Diagnosis.

We do not always think of dyspepsia when we find ourselves in the presence of all the morbid symptoms which we have just been cataloguing, and we may thus be led into error in our diagnosis. An investigation should be made of the condition of the digestive tube, the parents should be questioned as to the antecedents of the patient, and we should attach great importance to the manner in which the child was fed as an infant. When we have obtained the information which is necessary to enable us to understand the evolution of the dyspepsia, we should examine the stomach, examine for the sign of clapotage while the child is fasting, noting the limits of the stomach, and so be enabled to arrive at a diagnosis of gastrectasia.

Prognosis.

The prognosis is grave, although life may not be directly threatened, for the malady is chronic and interminable. Once the stomach has been dilated it remains so for years and we may even question whether it is possible for it to reacquire its physiological dimensions. Thus many men who have suffered in this way in childhood remain dyspeptic all their lives. However, growth may modify anatomical lesions, and we may, therefore, hope that a suitable treatment may lead to a cure of this dyspepsia of childhood.

Treatment.

In order to prevent the dyspepsia of childhood we must have a care for the alimentary hygiene of infancy; breast-feeding should be prolonged, the hours of nursing should be regular, and weaning should be gradual. At a later period, after the dyspepsia has become established, we must prescribe a severe diet. The amount of fluids, which are always taken in excess, should be restricted, no alcoholic beverages should be allowed, the child should drink milk with his meals and nothing between meals, and the food should be easy of digestion, such as purées of vegetables, eggs, well-cooked and tender meat, thick soups, but nothing raw, no salads, cabbage, cauliflower, rare meat, or sea food.

If there are symptoms of retention and decomposition of food in

the stomach the organ should be washed out with Vichy water. We may prescribe magnesia, bicarbonate of sodium, nux vomica, or benzonaphthol to aid digestion and bring about intestinal antisepsis. Cutaneous revulsion, by means of dry rubbing, salt baths, etc., should be practised.

Acute Indigestion.

Children, who are naturally intemperate in their desires, are greatly exposed to indigestion and acute gastric catarrh. I have considered these two troubles under one head, since they are often united. Indigestion, when it results from a too copious repast, from indigestible or spoiled food, may be accompanied by more or less prolonged gastric catarrh, fever, coated tongue, feeling of fatigue, etc. Sometimes we see grave symptoms of gastrointestinal autotoxæmia, such as repeated, fetid diarrhœal discharges, convulsive movements, algidity, etc.

Indigestion, apart from acute diseases, of which it is but one of the symptoms, is seen more commonly in children who have overeaten, and in those who have a weak stomach. The symptoms are anorexia and fever, reaching perhaps to 39°, 39.5°, or 40° C. (102° to 104° F.), but falling in the morning, and never remaining at this height for a long period. There is usually constipation, the tongue is broad, marked by the teeth, and covered with a thick coating. Epistaxis is rare. Sleep is disturbed and the child has nightmare. There is absolute anorexia, the child even having a disgust for food. The abdomen is rather sensitive to pressure and may be a little swollen. Diarrhœa is less common than constipation. This condition lasts but a few days and is devoid of gravity.

The diagnosis, however, may be difficult, and we may be led to suspect typhoid fever, influenza, meningitis, or one of the eruptive fevers. But after a few days the temperature curve will be seen to have marked morning remissions and the affection will terminate rapidly.

The child should be treated by evacuants, such as ipecac, tartar emetic, calomel, or castor oil. Rest in bed should be ordered and the patient should be put upon a milk diet, but may be allowed acidulous drinks.

DISEASES OF THE INTESTINES.

Diarrhœa, which is so frequent in children, is an expression of enteritis or gastroenteritis, that is to say, a more or less intense inflammation of the gastrointestinal tract. We distinguish acute and chronic forms.

Acute Gastroenteritis.

Etiology.

The usual causes of acute diarrhœa are artificial feeding, the use of raw, sour, or infected milk, or the premature ingestion of solid food; these causes are most active during the warm season (summer diarrhœa). The nursing-bottle is so often the cause that this diarrhœa has been called "the bottle disease." Among the most pernicious influences we may cite early and rapid weaning, especially in summer. Dentition, which is so often accused, has no certain or important action in this respect. The influence of the season cannot be denied; heat alters the milk and favors or aggravates digestive troubles; indeed the highest expression of acute diarrhœas, namely cholera infantum, is hardly ever seen except in summer. Contagion may at certain times be active in the causation. When children are nourished exclusively at the breast they escape diarrhœa. Cholera infantum, called also choleriform gastroenteritis, is due to an increase of virulence of the bacterium coli commune, and affects especially children of from one to three months of age, or after that those of twelve months, the usual age for weaning.

The pathogenic microbes described by Damaschino and Clado, Hayem and Lesage, in infectious green diarrhœa, microbes which are without doubt identical with Escherich's bacillus, make us fear contagion and impose upon us the duty of isolating the sick children and of disinfecting objects which may have been soiled by them.

Pathological Anatomy.

The lesions are slight in comparison with the symptoms. There have been observed a punctate or diffused congestion, hemorrhages, a swelling of Peyer's patches, and an abnormal prominence of the closed follicles (psorenteria). The lesions may extend from the stomach to the rectum, constituting a gastroenterocolitis. The lymphatic glands and the viscera connected with the intestine (liver, etc.) may become congested secondarily. An examination of the intestinal contents shows curdled milk, the remains of undigested food, mucus, greenish streaks, matter resembling sorrel or spinach; in other parts we see a white, glue-like substance showing the absence of bile. The intestinal contents, very fetid, often have a cadaveric odor.

The stools are very often acid and of a green color, either through the presence of bile or as a result of the action of a bacillus, crescent-

shaped, semicircular, or S-shaped, which has been called the bacillus of green diarrhœa, but which is probably merely a virulent form of the bacillus coli communis. The microbe has been cultivated and has been seen to secrete a green pigment. There may also be other infectious agents in this form of diarrhœa. Green diarrhœa is seen only in nursing children under the age of two years, and is never seen in later childhood or in adult life. Besides this green diarrhœa we may see other forms, watery, mucous, yellow, or whitish, which are no less infectious in character.

Symptoms.

The beginning is sometimes gradual, sometimes sudden. The fæces which were yellow and homogeneous become liquid, unformed, and green or colorless. They cease to be homogeneous and are seen to be composed of two portions: one liquid which may become green on exposure to the air, the other solid and grumous. The odor is strong, acid or fetid, and the reaction is acid. The number of stools may be ten or twenty or more a day. The abdomen is tympanitic, gas is discharged from the rectum and from the mouth, there is vomiting, and the child groans and betrays by his anxious and contracted features the colic from which he suffers. When the diarrhœa is profuse the urine is diminished in quantity and may be suppressed. It often contains indican. The thirst is excessive and the child seizes with eagerness the nursing-bottle when presented to him. The skin quickly becomes pale, the eyes hollow, the nose pinched, the ears cold, and the body emaciated. Contact with the acid and irritating discharges causes an erythema in the anogenital region, on the buttocks and thighs; the epidermis becomes detached, and fissures and ulcers are formed.

The diarrhœa may be of short duration, recovery taking place in two or three days; it may relapse, or it may give place to an obstinate constipation.

In the excessively acute cases (cholera infantum) the child is suddenly attacked with vomiting, first alimentary in character, later aqueous and bilious, and then with diarrhœa; the tongue is dry, the abdomen is sunken, the voice grows weak, and the algid stage comes on. Death may take place in one or two days. In some cases there is high fever, the thermometer marking 39° or 40° C. (102° to 104° F.); in other cases the diarrhœa is apyretic and the child dies having a subnormal temperature. Convulsions and coma may terminate the scene. In some cases of infectious diarrhœa there may occur bronchopneumonia, which, according to Sevestre and Lesage, may be due to the bacterium coli commune.

Prognosis.

The termination of these acute forms of diarrhœa is always uncertain, and however benign the symptoms may appear at the beginning we never know how the case will end. The prognosis varies also according to the age, being worse the younger the child is; according to the season, being less hopeful in summer than in winter; according to the alimentation, bottle-fed children and those weaned too early being in especial danger; and according to the previous condition of the child's health, dyspepsia and rickets rendering the prognosis more grave. The diarrhœa of breast-fed children is usually without gravity, but that due to premature weaning is formidable.

Diagnosis.

It is easy enough to recognize the diarrhœa but that is not sufficient, for it is necessary to determine the nature of this diarrhœa, which may be done by chemical and bacteriological examination of the fæces. If the diarrhœa is purely bilious a drop of nitric acid added to the discharges will give a violet or pink tinge and litmus paper will be strongly reddened. In the case of green and infectious diarrhœa a drop of nitric acid decolorizes the discharges and litmus paper is not reddened.

Can we admit the existence of a diarrhœa of dentition? The two phenomena often coincide, but the true cause of the diarrhœa resides elsewhere, in the faulty alimentation rather than in the eruption of the teeth.

Treatment and Prophylaxis.

If we wish to prevent the infectious diarrhœas of childhood we must mount guard before the digestive tube, preventing the admission to it of such harmful substances as decomposed, indigestible, or infected food. This is easily accomplished in the case of breast-fed children, but is difficult and demands constant care in the case of artificially fed children. The nursing-bottle must be absolutely clean, the milk should be sterilized, the premature use of solid food should be forbidden, early and rapid weaning must not be permitted. In institutions where there are many children, such as hospitals and maternities, we must isolate those who are attacked with diarrhœa and carefully disinfect all objects soiled by their discharges by means of corrosive sublimate 1:100, or sulphate of copper 1:100. The bottles of milk should not be left uncorked in the wards, for the atmosphere may be infected.

The treatment of the diarrhœa varies according to the case and

to the age of the patient. When it is simple, lienteric, due to overfeeding, we must return to the normal régime, a milk diet, and should give alkalies or astringents, such as lime water, Vichy water, and bismuth. When the diarrhœa is more profuse the child should fast for from twelve to twenty-four hours, being allowed only carbonated mineral water, egg water, rice water, or Sydenham's decoction. To these may be added bismuth, 1 to 4 gm. (gr. xv.–lx.) of the subnitrate or salicylate, Sydenham's laudanum, one or two drops, or paregoric, ten to twenty drops. We may endeavor to obtain direct antisepsis of the accessible cavities of the digestive tract by means of a tepid boric-acid solution injected through a tube high up into the colon, and of abundant intestinal irrigations in order to carry off the toxic substances from this portion of the intestinal tract. Lavage of the stomach by Vichy water or boiled water may be practised two or three times a day.

Calomel in small doses of 1 or 2 cgms. (gr. $\frac{3}{4}$–$1\frac{1}{2}$), repeated three or four times a day, lactic acid 1 or 2 gm. (gr. xv.–xxx.), or hydrochloric acid 0.5 gm. (℥ vij.), may render good service. It has been claimed also that intestinal antisepsis by means of salol, betol, or benzonaphthol is useful.

The tendency to algidity and to syncope may be combated by inhalations of oxygen, warm baths (38° C.=100° F.), mustard baths, stimulant friction, hot flannels, or subcutaneous injections of caffeine and ether.

Chronic Gastroenteritis.

An acute simple diarrhœa may, in consequence of the incessant repetition of the factors which have caused it, pass into the chronic state; and we often see dyspeptic and rachitic children with constant diarrhœal discharges, without fever and without colic, which cause an excessive emaciation. This simple chronic diarrhœa may be interrupted by acute exacerbations, accompanied by fever, abdominal distention, and melæna. Sometimes the diarrhœa is chronic from the beginning and is then associated with some grave anatomical lesion such as the ulcerations of anæmia, leukæmia, chronic malaria, or intestinal tuberculosis.

Tuberculous enteritis is not very uncommon in later childhood. It is shown by an obstinate lienteric diarrhœa in which alimentary substances may be recognized in the fecal matters in the midst of mucus, bile, and sometimes blood. The abdomen is soft and tender on pressure and sometimes we may feel enlarged mesenteric glands deep down in the abdomen. What strikes the attention most is the gravity of the general condition; the child is emaciated, cachectic, and has

sweats and hectic fever every evening; his legs are swollen by œdema and purpuric spots are visible here and there. Death occurs from marasmus, the extent of the lesions rendering assimilation impossible. At the autopsy in these cases we find, in addition to disseminated tubercles in various organs, numerous and deep ulcerations of the intestines, especially in the second portion of the small intestine. The large intestine, however, is not always spared, and we sometimes find the cæcum thickened and dotted with ulcerations (tuberculous typhlitis). This tuberculous enteritis is the most serious of all the forms of chronic enteritis.

The diarrhœa of children affected with chronic malaria rapidly reduces them to a condition resembling that just described, unless we intervene in time and prescribe quinine and change of air. Children who have suffered long from suppurations of serous membranes, joints, or bones may be taken with diarrhœa, indicating amyloid degeneration of the liver, intestine, etc.

In rare instances intestinal worms have caused chronic enteritis and diarrhœa. Cima[22] has reported a case of fatal intestinal catarrh in a child of three years caused by the presence of trichocephalus.

We sometimes see diarrhœa in older children of an arthritic stock who are great eaters, and who have for a long time had digestive troubles, as alternating diarrhœa and constipation, abdominal distention, tenesmus, and mucomembranous or bloody stools. In mucomembranous enteritis there is a discharge of false membranes which may resemble worms, of frothy mucus, and of blood, accompanied by more or less acute colic. John Thomson[23] has seen recurrent mucomembranous enteritis in a girl of two years, and Cantru[24] has reported cases in girls of eleven, twelve, and fourteen years, and in a boy of ten years. In these last cases the enteritis appeared to have caused epileptiform crises which disappeared after the intestinal trouble was cured.

The follicular enteritis of the Germans is a recurrent mucomembranous diarrhœa which is found especially at the period of weaning in overfed children. It may be accompanied by fever and grave general symptoms, such as weakness, anæmia, algidity, etc. The stools often contain pus, blood, mucus, frothy material, and matter looking like sputum.

In the treatment of chronic diarrhœa of children, whatever may be its form, we must pay special attention to the diet, permitting only soft food, such as scraped raw meat, eggs, boiled fish, purées of dried vegetables, and milk. The mineral waters suitable for these cases are those of Plombières especially, and in some cases of Châtel-Guyon, Bourbon-Lancy, and Vichy.

It is often well to give large rectal injections of solution of boric acid or borax (1 : 100), prolonged warm baths, astringent suppositories (rhatany), or enemata of nitrate-of-silver solution (1 : 300 or 500). Internally we may give subnitrate of bismuth in doses of 2 to 4 gm. (gr. xxx.–lx.) in solution with syrup of quince and laudanum. In some cases an inert powder, like talc (℥ iss.–iij. in milk or bouillon) may be of service.

Children suffering from chronic diarrhœa should be warmly clad, the anterior surface of the abdomen being covered with cotton batting or flannel.

Constipation.

A child is said to be constipated when its alvine discharges are less frequent, harder, and less copious than normal.

Etiology.

Constipation may be congenital or hereditary in arthritic or nervous children or those who present an intestinal anomaly, such as lengthening and bending of the descending colon (Jacobi), dilatation of the colon (Hirschsprung, Mya), or narrowing of the intestine. More commonly, however, constipation is due to a faulty diet, cow's milk, too much starchy food or sugar. It may depend also upon the presence of fissure of the anus, rectal polypi, or hemorrhoids.

It may occur very early in life, as when there is retention of meconium in the new-born, or later, in nurslings or children who have been weaned. In school children we often see it as a consequence of a too sedentary life, the abuse of sweets or cakes, or a too exclusively meat diet. In many children constipation is associated with dyspepsia and gastrectasia.

Symptoms.

In the nursing child we may observe that the stools are dry, hard, and rounded, although they may have preserved their normal color. At a later period the stools are brownish or blackish in color and are expelled at long intervals, every two, three, four, or even five days. The child suffers at the time of defecation. He often has colic and abdominal distention, and it may be that he cannot obtain a passage without a suppository, enema, or purgative. On palpation we may be able to detect hardened scybala in the descending colon and sigmoid flexure. The constipation causes headache, anorexia, thirst, insomnia and nightmare, skin eruptions (urticaria, strophulus, or eczema), and sometimes fever and meningitic symptoms. In the course

of time it induces a sort of intestinal septicæmia, and exposes the child to appendicitis. When it is of long standing and rebellious to treatment it is often complicated by mucomembranous stools and melæna.

Treatment.

The child's diet must first of all be modified, and the saccharine, starchy, or too nitrogenous food must be replaced by green vegetables, dilute milk, white meats, Graham bread, and cooked fruits, and regular excercise in the open air must be prescribed. In the case of nursing children we must give laxatives, such as syrup of peach blossoms, syrup of manna, oil of sweet almonds, syrup of chicory, or Vichy water. In preference to enemata we may employ glycerin suppositories, which possess the undeniable advantage of not dilating and paralyzing the intestine. Massage of the abdomen is sometimes of service. The best of the mineral waters in these cases is Châtel-Guyon water.

Melæna.

It is not rare to see blood in greater or less amount in the stools of children of any age; it may be pure, coming then from the large intestine (dysentery, hemorrhoids, polypi, colitis, etc.), or tarry in appearance (ulcer of the stomach or of the duodenum or other portion of the small intestine); sometimes the source of the hemorrhage is an intestinal invagination. But there is a special affection, melæna of the new-born, a sort of hemorrhagic disease, possibly infectious in nature, which has a special course and symptoms, and frequently terminates fatally.

Etiology.

True melæna is not encountered in one of a thousand new-born children. The blood may come from the stomach or intestine, or the melæna may be false (melæna spuria), the blood in such case coming from the mouth of the child or the nipple of the nurse and passing through the intestine after being swallowed. The loss of blood occurs during the first three days, sometimes as late as the eighth, but only exceptionally as late as the end of the second week. It usually follows pretty closely upon the expulsion of the meconium.

Sometimes the autopsy reveals the presence of an ulcer of the stomach or of the duodenum, sometimes nothing is found to account for the bleeding, and we are forced to invoke a special diathesis or an inherited morbid temperament to explain the hemorrhages observed from different places at the same time (stomach, intestine, umbilicus).

The family history of children suffering from melæna sometimes reveals the existence of hæmophilia or of syphilis. Klebs regards a septicæmia as the cause of the disease, Landau a thrombosis of the umbilical vein or of the umbilical artery, the resulting embolism of the intestinal arterioles causing ulceration; Townsend believes that we have to do with a general infectious disease.

Pathological Anatomy.

In twenty-five autopsies collected by Dusser[25] no lesions were observed in eleven cases, ulceration of the duodenum was found in four, one or more round and superficial gastric ulcers in nine. In one case observed by myself there were twenty ulcers of the stomach. Secondarily anæmia of the viscera has been noted, and sometimes acute fatty degeneration of the vessels (Buhl and Steiner).

Symptoms.

The affection generally begins suddenly. If the loss of blood is abundant, the child may be observed to grow suddenly pale; but when the amount lost is less it may be discovered only when the napkins are changed. When the hemorrhage is very profuse, not only does the child grow pale, but he is also agitated or may have convulsions, the extremities are cold, the pulse is filiform, and the cry is silenced. When the loss is moderate the patient will retain his animated appearance and normal color.

In 76 cases of hemorrhage from the digestive tract melæna existed alone in 35; hæmatemesis alone in 11; hæmatemesis and melæna coincided in 30 cases. The blood is sometimes red and fluid, sometimes blackened and clotted, or it may be tarry and grumous.

The hemorrhage lasts from one to three or more days. Sometimes blood flows at the same time from the umbilicus. In some instances icterus has been seen to accompany these hemorrhages (hemorrhagic icterus of the new-born). The child, worn out by the excessive loss of blood, rapidly emaciates and dies in the course of a few days, or if he recovers the convalescence is long and troublesome.

Prognosis.

The prognosis is very sombre, the mortality, according to most of the statistics, being over 50 per cent. (62 per cent. in Townsend's statistics, 79 per cent. in a collection of 709 cases taken from different authors). However, we must not despair, for Rilliet has reported the case of two children, twins, who suffered from very severe melæna during the first days of their life, but who recovered contrary to all expectation.

Diagnosis.

It is easy enough to recognize the presence of blood, but not so easy to say whence the blood comes. It may have been swallowed by the child, coming from the mouth, the nose, a laceration of the frænum, or possibly from a fissure in the nipple of the nurse. A successive examination of all these possible sources of the blood will enable us to arrive at a proximate notion of its origin in the case before us. If the blood is red and fluid it comes from the large intestine; if tarry, black, and grumous it will have come from the small intestine or stomach; if it is accompanied by hæmatemesis we may conclude that it has come from the stomach.

Treatment.

We may act directly upon the source of the bleeding in the stomach by giving two drops of the perchloride of iron every hour or every other hour in a teaspoonful of sweetened water; or ergotin may be given by the mouth or by hypodermic injection, or ice pills or brandy. At the same time, in order to stimulate the child, we may rub the body with brandy or essence of turpentine, put bottles of hot water in the bed, or put the child in a couveuse (incubator) at a temperature of 30° C. Inhalations of oxygen may also be given.

Appendicitis.

We know to-day, thanks to the works of the bold American surgeons, the capital rôle played by the vermiform appendix in inflammations in the cæcal region, in that disease which Albers, of Bonn, called stercoral typhlitis, and which was afterwards called perityphlitis. Antiseptic surgery has thrown a bright light on that obscure corner of human pathology, and no disease is better known now than appendicitis.

Etiology.

The cæcum itself is very rarely the seat of inflammation and stercoral engorgement; when it is, it may give the same symptoms as appendicitis. But there is a tuberculous typhlitis with thickening of the walls of the intestine and ulceration of its mucous membrane. The ulcers of typhoid fever or of dysentery may also be located in the cæcum.

Apart from these exceptional cases, it is the vermiform appendix which is usually affected. As a result of inflammation, the lodgment

of foreign bodies, of fæcal accumulations, or of calculi, its opening becomes obliterated, it becomes dilated, filled with pus, irritating the peritoneum in the neighborhood, forming adhesions with the intestinal coils, and menacing the child with peritonitis from perforation.

Appendicitis is more frequent in dyspeptic children than in others, in the constipated than in those who go regularly to stool. Dietary indiscretions, indigestion, or attacks of enteritis may predispose to it. It has been said that appendicitis is more common in certain families than in others, and this familial appendicitis is the heritage of the arthritic, of those suffering from gravel, etc. Dieulafoy has described an appendicular lithiasis which he compares to renal and biliary lithiasis. The calculus having transformed the appendix into a closed cavity, the contained microbes (bacterium coli commune and streptococci) become active, and infection is declared.

Appendicitis is almost unknown in the early years of childhood, and it is not until about the age of ten that we see the first cases.

Pathological Anatomy.

The appendix is more or less altered in all cases. It is large, knobbed, filled with pus, often perforated, and sometimes lost in the midst of purulent collections. When still present it is often adherent to neighboring viscera. Its mouth is ordinarily closed by a calculus, a fecal concretion, a foreign body which had been swallowed, or the like. As long as foreign bodies remain in the ampulla of the cæcum they are innocuous, and it is only when they have penetrated into the appendix that they become dangerous. This organ then becomes the seat of an inflammatory process which may go on to perforation, circumscribed peritonitis, abscess, or generalized peritonitis. Purulent collections may be formed at a distance, as in the liver (pylephlebitis) or in the pleura. The bacterium coli commune appears to play the predominant rôle in the complications of appendicitis.

Symptoms.

The child is suddenly seized with pain in the right iliac fossa, with constipation and obstinate vomiting. Upon palpation we may feel a hard, resisting, rounded swelling deep in the cæcal region; sometimes there is a doughy sensation over an area which may be traced vertically upwards or parallel to Poupart's ligament; sometimes there is a rather diffuse, illy defined tumor which is dull on percussion. A painful point may be detected on palpation at a spot equally distant from the umbilicus and the right anterior superior spine of the ilium. This is known as McBurney's point.

The child is suffering, he has an anxious expression, the appetite is lost, but there is thirst; fever is pronounced, and there is obstinate constipation. If peritonitis is present, there will be chills, colic, vomiting, atrocious pain radiating to all parts of the abdomen, and distention, and the child will cry out at the least contact. If the peritonitis becomes localized these symptoms will become less pronounced and the abdomen will become softer, the iliac fossa alone remaining boggy and painful on pressure; this may continue for two or three weeks or longer.

We may distinguish several degrees of the disease. There are mild cases belonging to the category of appendicular colic of Talamon, and severe cases: simple appendicitis without perforation in which the peritonitis is circumscribed and curable; subacute appendicitis with an encysted abscess; and acute perforative appendicitis which terminates fatally through general peritonitis.

This last form, the most to be feared of all, is too often beyond the resources of surgery, and our endeavor must be to prevent it by suitable measures instituted at an early period.

A child may have, at varying intervals, several attacks of appendicitis accompanied by localized peritonitis; convalescence is apparently perfect after each attack, but the fire is always smouldering and the patient's life is at the mercy of a new attack, which the surgeon's art is, however, able to avert.

Prognosis.

The prognosis, which is more or less gloomy according to the case, is always uncertain, for cases which are apparently the most benign may present sudden exacerbations of the inflammation, and relapses are always imminent. It is this fear, which is perfectly justified by many cases of recurrence, that has led surgeons to operate in the interval, when the symptoms of the disease are perfectly quiescent, and to resect the appendix.

Diagnosis.

The diagnosis of appendicitis is often difficult. We must take into account the mode of onset and the initial localization of the pain, in order to differentiate an intestinal invagination, internal strangulation, or hepatic colic. If symptoms of peritonitis are present we must examine into the case very carefully and endeavor to ascertain the condition of the appendix, whether the peritonitis is localized or general, and see whether the pulse and the patient's general condition would justify us in operating, and if so what the chances of a successful issue are, etc.

Treatment.

Medical treatment by means of local application of ice, by opium and belladonna ointments, by leeches and revulsives, has given good results. The child should be kept in bed on his back, and opium may be given internally in doses of 5 to 10 cgm. (gr. $\frac{3}{4}$ to $1\frac{1}{2}$) of the extract. If it is decided to move the bowels we must proceed with extreme caution, giving only minimum doses, as a teaspoonful of castor oil every morning. Most physicians advise against the use of laxatives in appendicitis.

When all goes well we may not be called upon to do anything more than this, but if the temperature rises and if we have vomiting and other symptoms of peritonitis we must resort to laparatomy in order to remove the purulent collection, if there is one, and to wash out the peritoneal cavity, rather than with the view primarily of removing the appendix, which is not always to be found and which may moreover be already destroyed by the suppuration.

In cases of recurring appendicitis we must not wait for a great explosion to force the hand of the surgeon, but rather operate deliberately in the interval of two attacks, in order to free the child from a useless organ the existence of which has become to him a standing menace.

Dysentery and Colitis.

Inflammation of the large intestine is very common during all the years of childhood. It is most usually due to overeating or the ingestion of raw and indigestible substances or green fruit. This inflammation is shown by colic, by frequent but small stools, by false desire, etc. This is dysenteriform colitis or sporadic dysentery. Epidemic dysentery is an infectious disease occupying the same seat in the intestine as the preceding, but much more grave in character and accompanied by profound and diffuse lesions of the large intestine.

Symptoms.

The symptoms are of the same order in these two forms, but of different intensity. There is a constant inclination to go to stool, but there is a discharge only of mucus, a bloody froth, matter resembling sputum or scraped meat, or pure blood. There are also false inclinations when no matter can be discharged, and painful tenesmus. The urine is diminished in amount, and the tenesmus may affect the bladder. We may find in the discharges membranous strips or cylinders seeming to indicate a desquamation of the mucous membrane of the large intestine.

The patient's general condition in the sporadic form is not bad; there is little or no fever, the appetite is diminished, the thirst is great, and the child is thin and pale. On palpation of the abdomen we find tenderness along the course of the large intestine. There may be at the same time with the dysentery, dyspepsia and gastrectasia.

Diagnosis.

The diagnosis rests upon the excessive frequency of the stools, the small quantity of fecal matter discharged, the presence of blood in the stools, pain, tenesmus, etc. The satisfactory state of the general health, the absence of fever, and the sporadic occurrence of the cases will enable us to differentiate the condition from true dysentery, which is a very grave infectious disease, occurring especially where many are congregated together and suffering from cold, fatigue, and privations of various kinds.

Prognosis.

The prognosis of dysenteriform colitis is not very grave, notwithstanding the long continuance of the disease and the tendency to relapses, the intestinal lesions being superficial and of little extent. We must not forget, however, that this enteritis of the large intestine favors the development and increased virulence of the bacterium coli commune.

Treatment.

We must begin by a reform in the alimentation of the children, milk for the younger ones, soft food for the older; no wine, fermented liquors, raw substances, fruits, or salads, and very small quantities of either fluids or solids.

Intestinal antisepsis may be attempted by means of calomel given by the mouth or intestinal irrigations with solutions of boric acid or borax. In the severe cases we may make use of injections of corrosive sublimate (1:5,000), of acetate of lead (1:1,000), or of nitrate of silver (1:500).

For the relief of the pain we may give small enemata, about five ounces of starch water containing two to five drops of Sydenham's laudanum. The painful symptoms may also be greatly ameliorated by means of prolonged warm baths, of hot cataplasms on the abdomen, or of inunctions with warm camomile oil or chloroform liniment.

The possibility of taking cold should be guarded against by a flannel belt.

Intestinal Invagination.

Among the different varieties of internal strangulation, intestinal obstruction, and occlusion, invagination is the least rare in children. It is often a post-mortem phenomenon and then is of no importance; in these cases it is limited to the small intestine and is always reducible. Pathological invagination is a very different matter.

Etiology.

This is a disease of infancy, of the first months or of the first year of life, more common in boys than in girls, in the ill-nourished and those suffering from gastroenteritis than in healthy subjects. Among the exciting causes have been alleged falls, blows on the abdomen, crying, and struggling, but very often the disease surprises us by its suddenness and spontaneous occurrence.

Pathological Anatomy.

The invagination occupies usually the large intestine; above its seat the intestine is dilated, but below it the large intestine is reduced in size and it seems as though the small intestine were directly continuous with the sigmoid flexure. We find in the left iliac fossa a large doughy tumor, soft, purplish in color, which is the invaginated intestine. If we pull upon its upper portion we may, unless adhesions have formed, reduce the invagination. The internal surface of the invaginated cylinder is red, streaked with mucus and blood, and is sometimes ulcerated. The walls may be thickened, inflamed, or gangrenous. The invaginated portion of the intestine may slough away and be passed with the fæces, leaving behind it a stricture or a perforation. Spontaneous cure may be obtained in this way. When invagination occurs in older children it occupies the small intestine.

Symptoms.

The onset is sudden. The child is seized with fetid vomiting, rejecting first the milk, then bile and a fluid having a repulsive fecal odor; it soon becomes greatly depressed and dies in a few days. At the same time blood may be discharged from the rectum, and melæna is often a symptom of intestinal invagination. There is absolute obstipation in the beginning, but at the end of some days fragments of gangrenous intestine may be passed from the rectum. When there is not much abdominal distention we may feel a doughy, painful, ovoid mass in the left iliac fossa. Sometimes by a rectal examination

we may touch the lower part of this mass, and the invaginated portion has even been seen to pass through the anus. The child is restless, cries, has colic and tenesmus; the eyes are sunken, there is a characteristic hippocratic facies, the extremities are cold, the pulse is small and filiform; convulsions and coma often terminate the scene. In these sad cases death is seldom delayed more than three or four days. A spontaneous cure is possible, although rare, and especially in older children cases have been seen in which the child lived after the passage of intestinal fragments 15 or 20 cm. or even a metre in length. Death results either from toxæmia and collapse or from peritonitis following perforation. After a spontaneous recovery, when it takes place, we must reckon with the possibility of a relapse or of stricture of the intestine.

Diagnosis.

This is not always easy. The condition may be confounded with appendicitis, although the seat of the later is in the right iliac fossa, with peritonitis, or with cholera infantum, which often presents misleading symptoms. Melæna, which is the symptom of great importance, is nevertheless not pathognomonic, for it occurs in dysentery, in colitis, or in gastric or intestinal ulcer (melæna of the new-born). Congenital hypertrophy of the colon, or elongation of the large intestine, leading to attacks of constipation with meteorism, may occasion error in diagnosis.

Prognosis.

The prognosis is very grave and death is the usual termination. In very young children it is due to a sort of shock or acute toxæmia; at a later age the course of the disease is less rapid and it may even become chronic. When a cure follows the spontaneous elimination of the invaginated portion of the intestine, the trouble is not always at an end, for intestinal stricture is a frequent sequel.

Treatment.

Before all *non nocere* should be our watchword, we must avoid injury in the use of purgatives. It is preferable to immobilize the intestine by means of narcotics, by enemata of an ounce and a half of tepid water containing one or two drops of laudanum, by subcutaneous injections of one-sixtieth to one-thirtieth grain of morphine, or three-quarters grain of chloral in a little sweetened water every hour. An attempt has been made to reduce the invagination from below by means of gaseous injections, as of carbonic water, or insufflations

of air. The use of electricity has in some cases appeared to give good results, and the same is true of lavage of the stomach. But when invagination is recognized the preferable treatment is laparotomy and direct resection of the invagination.

Prolapse of the Rectum.

In very young children prolapse of the rectum readily occurs as a result of straining efforts during defecation, the mechanism being that of a more or less pronounced true invagination.

Etiology.

It is between the ages of two and five years that this affection is most common. It is seen in children who suffer from habitual constipation, from digestive troubles, from frequent attacks of enteritis or of enterocolitis, and in rachitic children in whom the abdomen is distended and the intestinal supports are relaxed. A paroxysm of coughing may cause a prolapse, and the accident is frequent in whooping-cough. It may result from the presence of a polypus.

Symptoms.

There is no pain or fever and the general health is good; the affection is a purely local one. It is manifested by the appearance at the anus during defecation of a red, rounded, bleeding mass covered with mucus and in the centre of which an orifice may be detected. It is constricted at its base by a ring of skin which is the dilated anus. Ordinarily this mass does not project far, but it may be of enormous size and prolapsed portions of intestine 15, 20, or 30 cm. or more in length have been observed. In most cases the tumor is easily reduced, but sometimes reduction is difficult and can be effected only by strong pressure combined with elevation of the pelvis. In some instances the prolapse is irreducible and the constriction and strangulation at its base may be sufficient to cause gangrene. In such a case there will be fever, vomiting, pain, and symptoms resembling those of intestinal occlusion.

Although reduction is usually easy a recurrence is the rule and there is often great difficulty in retaining the prolapsed bowel. Sometimes the prolapse recurs at each movement, sometimes only at longer or shorter intervals, or it may perhaps never return after once having been replaced. Sometimes it is complicated by fissure of the anus and painful perianal inflammation. The affection is not very grave, but it is a repugnant infirmity.

Treatment.

If the tumor does not return readily we must push it back by means of the fingers covered with vaseline or glycerole of starch. If reduction is still difficult we must place the child head down, and after the intestine has been returned it must be kept in place by means of a pad held in place by a T-bandage. To prevent a return of the prolapse a bed-pan may be used so as to avoid the necessity of straining in a vertical position. If the child defecates in a vessel he should be placed high so that the feet cannot touch the floor, for in this way it will be impossible for a very severe effort to be made.

If diarrhœa is present we may give bismuth, or if there is constipation we may resort to laxatives and injections.

To increase the contractile power of the sphincter ani daily injections may be given of cold water containing thirty grains of extract of rhatany, or suppositories of the same strength may be used. If the relaxation persists we may inject beneath the skin near the anus a solution of ergotin (gr. vij.) or of strychnine (gr. $\frac{1}{60}$).

If these measures fail we may make linear cauterizations with the thermocautery, or it may be necessary to resort to strictly surgical means for relief. Before going to this extreme, however, we must temporize and try all other measures, for a prolapse of the rectum may disappear spontaneously even after it has existed a long time.

Intestinal Parasites.

Parasitic diseases of the intestines are almost exclusively confined to childhood, and their importance is less than it was formerly supposed to be. Many children harbor a multitude of worms without suffering any injury and even without presenting any symptoms, the expulsion of the parasites being often the first indication of their presence. There are three principal varieties of worms found in the intestinal canal of children, namely, ascaris lumbricoides, oxyuris vermicularis, and tænia, and these are the only ones which will engage our attention, for the others are rarely met with and have moreover been already described in volume VIII. of this work.

Ascaris Lumbricoides.

These parasites, which closely resemble common earthworms, are from 10 to 25 cm. (4 to 10 in.) in length, the males being smaller than the females. The caudal extremity of the male is curved and is provided with a double penis. The female lays thousands of eggs

from 60 to 70 μ in diameter. The embryo, according to Davaine, requires several months to arrive at maturity, and two generations of lumbricoids cannot succeed each other in the same intestine. After the eggs have been expelled the embryos do not break their envelope and develop until their introduction into another human intestine where they find the necessary conditions of warmth and humidity.

Etiology.

The eggs are taken into the intestine in the drinking-water, or on salads, fruits, and other raw substances which have been washed in the infected water. In cities the increasing use of filtered water renders the occurrence of lumbricoids more and more rare, but they are very common in the country where the water supply is less carefully looked after. Breast-fed children whose only nourishment is human milk never have lumbricoids, and the parasites are encountered only after weaning has taken place. The etiology is therefore purely a question of feeding.

Pathological Anatomy.

Lumbricoid worms inhabit the small intestine, but may migrate to the stomach, the œsophagus, the pharynx, the biliary passages, the colon, etc. These migrations are seen especially in children who are suffering from fever, and in such cases not infrequently the worms are vomited, and may then pass into the nares, or exceptionally even into the larynx and trachea.

If the parasites accumulate in the cæcum they may penetrate into the appendix. When the intestinal walls are healthy the worms do not appear to have the power to penetrate them, but when there is ulceration or perforation the worms may escape and make their way into the peritoneal cavity, the bladder, and even under the skin where they form verminous abscesses. The number of lumbricoids varies much in individual cases; they have been encountered singly, by tens, or by hundreds. Massini, of Genoa, reported in 1886 the case of a girl of three years who passed from the mouth and from the anus in the course of two months no less than three thousand worms. When they are very numerous they may form masses of sufficient size to cause obstruction of the intestine.

Symptoms.

Often there are no symptoms caused by the presence of lumbricoid worms. Among the signs which have been said to point to the presence of these parasites are the following: a drawing of the lines of

the face, eyes circled with black rings, picking at the nose, dry cough, headache, vertigo, capricious appetite, indigestion, colic, vomiting, nervous restlessness, insomnia, palpitations and irregular action of the heart, alternations of pallor and redness of the face, syncope, strabismus, mydriasis, grinding of the teeth, meningitic symptoms, convulsions, epileptiform attacks, etc. Before admitting the value of all these symptoms we must assure ourselves, by an examination of the fæces, of the presence or absence of the worms or their eggs. The symptoms, when there are any, may be classed under the heads of local and general or reflex.

Local Accidents.—A perforation of the cæcum, appendix, or stomach may permit the entrance of the worms into the peritoneal cavity; a collection of worms may plug up the intestine and arrest the progress of its contents; ascarides have been found encysted in the liver after having passed up the ductus choledochus from the duodenum. The entrance of a worm into the larynx or trachea may give rise to symptoms of asphyxia; this is, however, a very rare occurrence.

Reflex Accidents.—Cases have been reported of amblyopia, strabismus, aphonia, convulsions, and chorea which have been cured by the exhibition of a vermifuge remedy. But all the reported cases of this sort do not bear close analysis, for most of them occurred in nervous or hysterical children, in whom the worms acted doubtless only as exciting and accidental causes of the affections observed. Accidents of this sort are in any case very exceptional. As a rule children have a great degree of tolerance for these worms.

Diagnosis.

The diagnosis depends entirely upon the results of an examination of the fæces, which will determine the presence of the worms; but we must not mistake for them certain cylindrical or filamentous débris of tendons, aponeurotic tissue, or vegetable fibres which have been ingested. In case of doubt we must employ the microscope, or we may burn the suspected matter, for the worms will then give forth a peculiar odor which is readily recognized once it has been smelt.

Treatment.

Notwithstanding the slight gravity of the symptoms, we must nevertheless endeavor to expel the worms. The most commonly employed vermifuge is semen contra (worm seed) which may be given in an electuary (1 to 4 gm.—15 to 60 grs.—in honey or confection), or in infusion with sweetened milk. Corsican moss (helminthochorton) may be prescribed in the same way (5 to 10 gm. in sweetened

milk). We give by preference santonin, the active principle of wormseed, in the dose of 1 cgm. (gr. $\frac{1}{6}$) per day for each year of the child's age; it is often given with an equal amount of calomel in the morning on an empty stomach. It may be repeated each morning for two or three days in succession. The remedy may also be given in the form of prepared lozenges. When given in too large dose it may cause dysuria, urticaria, xanthopsia, or alarming nervous disturbances.

In order to prevent lumbricoids the drinking-water should be filtered and children should not be allowed to eat raw food.

Oxyuris Vermicularis.

These worms are cylindrical, like lumbricoids, but much smaller, the males being about 3 mm. ($\frac{1}{8}$ in.), the females from 8 to 10 mm. ($\frac{1}{3}$ to $\frac{2}{5}$ in.) in length. The females deposit their eggs, which are 5 μ in length by 3 μ in width, in the rectum. The child may swallow the eggs in the drinking-water; the embryos are hatched in the small intestine, and descend into the colon and the rectum where they reach their full development. The etiology is the same as in the case of lumbricoid worms.

Symptoms and Diagnosis.

Pinworms cause only local symptoms. At night they pass out of the rectum and crawl about the anus and in the genital folds, and cause itching, tenesmus, and anal eczema. In little girls the parasites may irritate the vulva or pass into the vagina, causing vulvovaginitis. This pruritus recurs every evening when the child is in bed and continues from one to three hours, when it disappears and does not return until the following evening. Examination shows that the anus is red, irritated, sometimes bleeding, and it may be possible to detect the worms on some fold of the skin or mucous membrane. The worms as well as their eggs may be found mixed with the fæces.

Treatment.

The following is the plan of treatment which I always advise: 1. For three days in succession the child is to take in the morning fasting a powder containing 5 cgm. (gr. $\frac{3}{4}$) each of santonin and calomel in sugar. 2. Every evening mercurial ointment diluted with vaseline, one part to three, is to be applied within the anus. Instead of this ointment we may introduce a suppository containing salol or iodoform in cacao butter, or gray ointment, ten per cent. Ungar of Bonn gives immediately after a laxative four doses a day of naphthalin, of 15 to

40 cgm. (gr. ij.–vi.) each according to the age, between meals, for two or three days in succession, and recommends abstention from fatty foods. If this does not succeed a new course may be undertaken at the end of eight or ten days.

In addition to giving vermifuges by the mouth we may attack the worms directly by injections of oil, of cold water, salt water, diluted vinegar, or glycerin.

Tænia.

There are three principal varieties of tapeworms, namely, tænia solium from pork, tænia saginata from beef, and the bothriocephalus from certain varieties of fishes.

Etiology.

The use of raw or rare beef is the cause of the special frequency of tænia saginata in Europe, the parasite being often found in pale, anæmic children, who have been treated with raw meat. Breast-fed children never have tapeworm. The use of raw pork being less extensive and the flesh of this animal being more carefully examined, the occurrence of tænia solium is much less common. Bothriocephalus is still rarer, being seldom found in Europe outside of Russia and Switzerland, where there is a large consumption of lake fish.

Symptoms.

The functional troubles attributed to tapeworm are nil or doubtful, and the only sign which reveals the presence of this parasite is the passage of segments from the anus. When we examine a long enough piece we may observe the genital pores situated on the vertical borders, alternating irregularly (tænia saginata) or regularly (tænia solium). If we can obtain the head we observe that it is supplied with hooks arranged in a double row if it is a tænia solium, but not if it is the other variety. In the case of bothriocephalus the genital pores are situated in the centre of the segments and the head has no hooks or suckers.

The segments may be discharged at stool or at other times without attracting the child's attention.

The reflex nervous and digestive disturbances are the same as in the case of lumbricoid worms and are equally diverse and doubtful. Cases have been reported of narrowing of the visual field, of amaurosis, of monocular polyopia, and of epilepsy, symptoms which are indeed alarming, although hysteria often exists as a predisposing cause.

Epilepsy from worms may be seen in children of any age, even as young as three years; the aura is of long duration, the convulsions

may last ten or fifteen minutes, and the stage of coma is equally prolonged; all the stages of the attack are more prolonged than in ordinary epilepsy. In doubtful cases the results of treatment will serve to clear up the diagnosis.

As tapeworms are always in small number, if not solitary, there is never an accumulation of them causing symptoms of obstruction, as in the case of lumbricoid worms; they are well tolerated, they do not migrate, but they are more difficult to dislodge than the cylindrical worms.

Treatment.

The child should be prepared the evening before by taking nothing but milk and by receiving a copious enema. The following day, while fasting, he takes the tæniafuge, such as kousso (10 gm.), decoction of fresh pomegranate bark (15 to 20 gm.), ethereal extract of male fern (4 to 6 gm.), pumpkin seed in emulsion (50 to 60 gm.). After the tæniafuge a purgative should be given (10 to 20 gm. of castor oil). I prescribe the following:

℞ Ethereal extract of male fern, ...	4	(ʒ i.)
Essence of turpentine, ...	1	(mxv.)
Syrup of orange flowers, ...	30	(ʒ i.)
Peppermint water, ...	70	(ʒ ij.)

This is taken at one dose by a child of five to ten years. Half an hour later he takes 15 to 20 gm. (4 to 5 drachms) of castor oil. When at stool he should sit on a vessel containing tepid water so that the worm may be expelled without breaking, head and all.

If the head is not expelled we wait two or three months before renewing the treatment. In the case of children who can swallow capsules, they may take the extract of male fern in combination with calomel, 50 cgm. of the former, and 5 of the latter in each capsule, one capsule being given for each year of the child's age.

DISEASES OF THE PERITONEUM.

Acute Peritonitis.

Acute peritonitis may occur at any age, and may be due to a variety of causes.

Etiology.

In the new-born, peritonitis is a localization of the streptococcus, and is seen in cases of erysipelas of the umbilicus, umbilical phlebitis, etc. It may affect the fœtus before birth (fœtal peritonitis) and may then occasion an ascites which offers an obstacle to birth.

In later childhood a traumatism or a cold may cause peritonitis, but the disease is much more frequently consecutive to a lesion of the abdominal viscera, such as tuberculous or typhoid ulcers of the intestine, appendicitis, some affection of the gall-bladder, etc. Peritonitis may be secondary to some lesion of the liver, the spleen, the kidneys, or the genital organs. I have twice seen it as a sequel of vulvo-vaginitis in young girls.

Finally cases have been reported, and I have myself seen such, in which peritonitis appeared without any apparent cause or following upon pneumonia, the pneumococcus being in that case the pathogenic agent of the inflammation of the peritoneum. Pneumococcal peritonitis is indeed a well-recognized clinical entity.

Pathological Anatomy.

We find the peritoneum dull, injected, covered with fibrinous filaments; the intestinal coils are more or less adherent, and there is a purulent or seropurulent fluid, containing flocculi, in the pelvis and other dependent portions. Sometimes there is a limited encysted purulent collection, sometimes the inflammation is diffuse and general. When the collection is encysted it may open exteriorly through the umbilicus or penetrate into one of the viscera, the bladder, the intestine, the pleura, or the lung; when it is generalized it may be complicated by metastatic foci in the brain, the meninges, the synovial membranes, etc.

Symptoms.

The peritonitis may be exceedingly acute in its symptoms or insidious or even latent; when the latter is the case the inflammation is generally localized and encysted, in other cases it is most commonly hyperacute. That the latter is not always the case, however, is shown by an instance which I have observed in the person of a little girl, in whom, during convalescence from pneumonia, there formed insidiously a general suppurative peritonitis which suddenly discharged through the umbilicus and later through the vagina; the child recovered without special treatment.

If the peritonitis is acute and generalized, as after perforation, we note excessive, spontaneous pain, aggravated by movement, by respiration, or by palpation of the abdomen; tympanites, vomiting, first of food and later of bile, singultus, and eructations of gas; constipation is more common than diarrhœa; the facies is anxious and pinched; the pulse is small, rapid, and wretchedly poor; the temperature is usually elevated. The urine, which is always scanty, is passed

with distress; there is sometimes complete suppression. When the pus discharges spontaneously by the umbilicus, the peritonitis usually gets well spontaneously (eight times in ten, according to Gauderon).

The progress of the disease is rapid; there are hyperacute forms which kill in two or three days, acute forms which last a week, and subacute forms which may be prolonged and which may terminate in encysting of the pus. The prognosis, which is always grave, is especially so in cases of peritonitis resulting from perforation.

Diagnosis.

Appendicitis may be confounded with acute peritonitis, for it is often accompanied by similar symptoms, such as vomiting, atrocious pain, meteorism, fever, and constipation; it is moreover often complicated with peritonitis.

Intestinal invagination and internal strangulation are not always easily differentiated, for they have in common with peritonitis pain, tympanites, constipation, vomiting, and the abdominal facies. Fever is most frequently present with peritonitis and may serve as a differential symptom.

Tuberculosis of the peritoneum, in its acute and rapid form, will give trouble in the diagnosis; if a puncture has been made the fluid should be examined to discover the tubercle bacillus, the pneumococci, etc. Tabes mesenterica, or tuberculosis of the mesenteric glands, develops quietly without peritonitis, its presence being indicated by hard and round masses behind the intestines.

Finally we may see children who, without any appreciable or lasting peritoneal inflammation, have disquieting symptoms which have been described under the name of peritonism (Gubler). The absence of fever and the rapid and spontaneous subsidence of the symptoms will serve to distinguish this condition.

Treatment.

Treatment consists in immobilizing the intestine, and securing rest for the abdominal organs by the internal administration of opium, 1 cgm. (gr. $\frac{1}{6}$) of the extract or 1 mgm. (gr. $\frac{1}{6\,0}$) of morphine hydrochlorate for each year of the child's age, by chloral, the application of ice bags, or cataplasms. For the vomiting we may give champagne and cracked ice. Calomel may sometimes be given in divided doses, 5 cgm. for each year of the child's age, in ten doses, one each hour. Sometimes we may try laparotomy and lavage of the peritoneum. This intervention has often been followed with success in the case of pneumococcal peritonitis.

Tuberculous Peritonitis.

Tuberculosis of the peritoneum, which is less common in infancy than in later childhood, may present itself under two distinct clinical forms. There may be an acute miliary tuberculosis which may attack the peritoneum like other serous membranes or the viscera, without determining any predominating abdominal symptoms. The second form of tuberculosis is localized in the peritoneum which it invades primarily, or secondarily to tuberculosis of the intestine. In the first case the peritoneal tuberculosis is lost in the general symptoms of miliary tuberculosis; in the second case the affection develops alone and is chronic in its course. The latter is the form which we shall study here.

Etiology.

In addition to conditions of heredity and of predisposition we have to note especially digestive troubles, the ingestion of infected food, of raw milk from sick cows, of tuberculous meat, etc. In all these cases infection occurs through the intestine and the lymphatics. Very often, indeed, we observe intestinal troubles preceding the peritonitis, and at the autopsy, in cases of tuberculous enteritis, we often find the peritoneum inflamed.

The occasional exciting causes of tuberculous peritonitis are indigestion, blows, falls, and severe muscular efforts in which the peritoneum may be bruised.

Pathological Anatomy.

There is usually but scanty exudation, although occasionally we may see a very considerable ascites. The fluid is rarely serous and clear, being rather seropurulent, sanious, blackish; it may be encysted by false membranes, or by adhesions which are formed between individual coils of the intestine or between them and the liver, the spleen, the diaphragm, or the abdominal wall. The mass of the intestines is often covered over and concealed by thick membranous exudates, containing tubercles in varying degrees of evolution (granulations, caseous foci, or abscess). At the same time we may observe miliary granulations scattered through the intestine, the liver, the spleen, the diaphragm, and the abdominal wall. The intestine is sometimes perforated, and pus, fecal matter, or foreign bodies may escape thence into the peritoneal cavity. Sometimes there are perforations forming communications between adjacent intestinal loops. The pus frequently discharges externally at the umbilicus, and an artificial

anus may thus be formed. The tuberculosis may spread thorugh the lymphatic channels from the peritoneum to the diaphragmatic pleura.

These lesions are not always incurable; a fibrous tissue formation (sclerosis) may encyst, isolate, or strangulate the tubercles, and the pus may be absorbed; but the child may suffer later from the fibrous bridles which remain and may cause strangulation of the intestine.

Symptoms.

The onset is ordinarily slow and insidious with vague symptoms, such as digestive troubles, anorexia, dull colic, and alternating diarrhœa and constipation; the child is pale and emaciates rapidly. Then the abdomen becomes distended; it is less flattened than in ascites and is rather hard to the touch. Its consistence is not everywhere equal and uniform, for we may discover portions which are soft or fluctuating alongside of other hard, resistant, painful masses, which are irregular on their surface and may cause a crepitation when moved. Percussion gives an irregularly distributed dulness, not resembling that of ascites and not being displaced as that is by changes in position. The fluid, which may have been abundant in the ascitic form, may disappear, and the abdomen then retracts, forming a hard, resistant plane which prevents us from distinguishing the subjacent intestinal folds and which forms a sort of wall over the viscera which it covers.

The general condition deteriorates, emaciation progresses, the appetite is lost, the child has night sweats, diarrhœa, pain, sometimes hiccough and vomiting, and perhaps fever, the latter being due to acute exacerbations of the peritonitis or sometimes to perforation. Notable remissions may prolong the course of a tuberculous peritonitis, which, in any case, progresses slowly unless its course is accelerated by some complication, such as intestinal perforation, an acute exaggeration of the peritonitis, meningitis, or some pulmonary trouble. Toward the end the little patients become cachectic and suffer from œdema of the lower extremities, anasarca, or purpura. The duration of the disease is ordinarily from six to eighteen months.

Diagnosis.

When the effusion is abundant tuberculosis may not be recognized and the ascites may be regarded as of hepatic origin. An exploratory puncture will sometimes enable us to determine the nature of the fluid by bacterioscopic examination or by the results of inoculation in animals. But the results of such an examination are not always conclusive and we may sometimes hesitate between cirrhosis of the liver and tuberculosis of the peritoneum, especially as there is

an hypertrophic, fatty cirrhosis of the liver of tuberculous origin in children.

Tabes mesenterica is differentiated by the presence of hard retroperitoneal masses unaccompanied by ascites or peritonitis.

Certain cases of tuberculous peritonitis may get well, even spontaneously, and probably essential ascites or simple chronic peritonitis is a benign and curable form of peritoneal tuberculosis.

Treatment.

Locally we may make revulsion with the object of combating the acute inflammatory attacks, by flying blisters, tincture of iodine, or punctate cauterizations. At the same time compression of the abdomen may be made by means of a bandage or a shield of collodion. When abundant effusion exists we may evacuate it by puncture. In this ascitic form laparotomy followed by lavage of the peritoneum has given good results in the hands of Lawson Tait, Clarke, Terrillon, and others. Surgical intervention of this nature is justified only in case the tuberculosis is confined to the peritoneum, but if the lung is involved we must abstain. Of forty-six cases treated by laparotomy Aldibert found forty-two cases of definitive or temporary cure and four deaths; nine of the patients remained cured at the end of one year, and two after two years.

Rendu and Spillmann have suggested injections of camphorated naphthol, but Netter has seen grave accidents resulting from this procedure.

General treatment, good food, cod-liver oil, syrup of the iodide of iron, arsenic, creosote, and salt baths must be insisted upon. Revilliod prescribes the following:

℞ Pearson's solution,
Creosote, ... āā gtt. xx.
Syrup of walnut, ... ℥ i.
Elixir of garus, ... ℥ ss.
Water, ... ℥ v.
M. Sig. A teaspoonful two or three times a day.

Ascites.

Ascites exists when the peritoneal cavity is occupied by an effusion of a clear serous fluid containing albumin.

Etiology.

Ascites is said to be primary when it follows a cold or the ingestion of cold drinks in children in otherwise good health; but it is doubtful whether there really is such a form. It is secondary when

it follows nephritis, scarlatina, measles, rheumatism, asystole, pulmonary tuberculosis, rachitis, grave enterocolitis, or chronic malarial infection. Even more frequently the cause resides in cirrhosis of the liver. Ascites in the fœtus may be due to syphilis or to a lesion of the portal vein.

Symptoms.

The belly is large, flattened laterally, and more or less tense according to the amount of fluid present. The skin of the abdomen is seamed by bluish veins passing from the lower to the upper portions; the umbilicus is projecting. There is no pain either spontaneous or on palpation. Percussion gives a tympanitic sound in the upper part of the abdomen and flatness in the lower portions, this flatness varying with the position of the child, being always in the dependent parts. When percussion is made with one hand, the other hand being applied to the opposite side of the abdomen, the impulse is transmitted in a wave through the fluid. All these signs indicate that the peritoneal cavity contains fluid, that this fluid is abundant, and that it is free, not being encysted. When the fluid is not abundant, some care may be necessary to determine its presence. An exploratory puncture will show us the nature of the fluid.

An abundant effusion interferes mechanically with the proper play of the lungs and with the heart's action, and the little patients have therefore dyspnœa and palpitations. In extreme cases there may also be œdema of the lower limbs.

Diagnosis.

Retention of urine may be differentiated by the seat and the form of the area of flatness, for the latter is in the hypogastric region and its upper limit forms a curve with the convexity looking upwards; a still more certain sign is that the flatness may be made to disappear by the introduction of a catheter and the withdrawal of the urine from the bladder.

Peritonitis is rarely so indolent in its symptoms as ascites, the effusion is usually less abundant and less freely movable in the abdominal cavity, and the area of flatness is not so readily displaced by change of position. We must not forget, however, that in tuberculous peritonitis there is a form without acute symptoms and with considerable effusion which may cause much confusion in diagnosis.

Ovarian cysts, which are sometimes seen in little girls, give a round prominent shape to the abdomen, which can hardly be confounded with ascites. Simple tympanites is to be distinguished by the percussion note.

It is often difficult to discover the cause of ascites, and our first care should be to examine the liver to determine its volume and consistence. The urine should also be examined.

Prognosis.

This will vary according to the cause. Primary ascites, if such an affection exists, would be less serious than any other form, but the malady is almost always, if not invariably secondary. Recovery is possible, however, in many cases of secondary ascites.

Treatment.

We must begin by giving purgatives and diuretics, such as calomel, digitalis, and the oxymel of squills. Antisyphilitic treatment by iodide of potassium and mercury may be indicated. If the effusion is very abundant a puncture may be necessary.

Tabes Mesenterica.

Tuberculosis of the mesenteric glands is found rather frequently at autopsy, but is rarely recognized during life, and cases which have been diagnosed as such are most often simply diseases of the peritoneum, ascites, or rachitis with enlarged belly. Barthez and Rilliet found mesenteric tuberculosis present once in every two cases of tuberculosis, but the disease was extensive only once in every sixteen cases. The older physicians regarded tabes mesenterica as a very common affection, and they distinguished two varieties, namely, an indolent form (which was simply the enlarged belly of rachitis) and a painful form (which was tuberculous peritonitis).

Tabes mesenterica merits therefore but a very small place among the clinical diseases of childhood, especially as it is secondary to intestinal tuberculosis. It occurs under the form of hard, rounded, solid masses, but little sensitive on palpation, situated deeply down in the abdomen, and very movable. One is sometimes led to suspect the presence of hardened fecal masses in the intestine, but they are found not to be displaced after the administration of a purgative. Sometimes the affection is complicated by an effusion in consequence of irritation of the peritoneum in the neighborhood of the tuberculous glands, or by œdema of the lower extremities through pressure on the vena cava. The children die in cachexia or in consequence of a generalization of the tuberculosis.

The treatment should be roborant in character, good food, cod-liver oil, salt baths, residence in the country, etc.

DISEASES OF THE LIVER.

Icterus.

We distinguish two forms of jaundice in children, namely, icterus of the new-born, and icterus occurring in later childhood.

Icterus Neonatorum.

Etiology and Pathogenesis.

Many new-born infants, especially those who are weak, delicate, or prematurely born, have, during the first days of life, a more or less yellowish discoloration of the integuments which gradually diminishes in intensity and finally disappears in the course of two or three weeks without leaving behind any traces of its presence. This is the simple and benign form of icterus of the new-born; it is due to catarrh of the biliary passages and is similar to the catarrhal icterus of adults.

But we see, in maternity hospitals especially, another much more grave form of icterus, which pursues a course similar to that of infectious diseases, and terminates fatally in a large number of cases; this form coincides frequently with a septicæmic condition of which it may be the expression. It has been described by Laroyenne under the name of *ictère bronzé hématique*, and is also known as Winckel's disease, or pernicious icteric cyanosis with hæmoglobinuria; according to Baginsky acute fatty degeneration of the new-born is only an extreme degree of this affection.

Icterus gravis neonatorum is without doubt a microbic disease, and Rénon has found in it lesions produced by the proteus vulgaris. In addition to angiocholitis of intestinal origin, icterus of the new-born may depend upon hepatic syphilis or a congenital malformation, such as absence of the bile ducts in a case reported by Henoch.

As regards the milder forms of icterus it has been observed that feeble children and those who have suffered during their entry into the world (difficult labor, breech presentations, version, asphyxia) are more exposed than vigorous and normally born children. Among the first there are evident circulatory troubles which explain up to a certain point the perturbation of the biliary functions without, however, indicating its mechanism. Other causes which have been invoked are retention of meconium, obliteration of the ductus choledochus by a plug of mucus (Virchow), and an alteration of the blood.

It is possible that the icterus in most cases is due to the action of the microbes inhabiting the small intestine and which, even in the new-born, might have a pathogenic action; all forms of jaundice, therefore, even the most benign, would be of an infectious nature.

Pathological Anatomy.

In the fatal cases (icterus gravis) there have been found fatty degeneration of the liver and kidneys, hypertrophy of the spleen, tuberculosis of the kidneys (Parrot), pulmonary, cardiac, and cerebral ecchymoses. The viscera are stained a yellow color. Picot and d'Espine found in one case a congenital hypertrophic cirrhosis of the liver with angiocholitis of the canaliculi which were thickened in their walls and obliterated by the proliferated epithelial cells.

Symptoms.

The icterus may declare itself on the first day of life, but it ordinarily does not appear before the second or third day. The skin becomes yellow as lemon, the mucous membranes of the eyes and of the mouth present the same coloration; this enables us to distinguish true jaundice from the false icterus seen occasionally in infants, in whom also the stools are not decolorized and the urine is normal. But even in true icterus of the new-born the stools are not always colorless; there is then polycholia rather than biliary obstruction. At the end of from eight to fifteen days the color begins to fade.

Prognosis.

These little patients may, notwithstanding the jaundice, increase in weight, or they may fall off very rapidly in a way to cause great alarm. In the grave forms of infectious icterus we may see the supervention of diarrhœa, vomiting, and hemorrhages from the umbilicus, stomach, intestine, or kidneys. This variety is of gloomy prognosis, but recovery is the rule in the mild forms.

Treatment.

In the grave form of the disease we must endeavor to obtain intestinal antisepsis by mean of calomel (gr. $\frac{1}{6}$—$\frac{1}{3}$ every morning) and rectal injections, and must also institute antisyphilitic treatment by means of mercurial inunctions.

In the simple cases we may content ourselves with alkaline baths, with the addition of Vichy water to the milk, and with frictions over the hepatic region with an ointment containing bicarbonate of sodium (20 per cent.) and iodide of potassium (10 per cent.).

If the child is at the same time very feeble we may place him in the couveuse at a temperature of 30° C. and have him inhale oxygen. In maternities and children's hospitals every case of suspected grave icterus should be carefully isolated, for the disease has been seen to spread epidemically.

Icterus of Childhood.

We find in childhood, as at a later period of life, two forms of icterus, the catarrhal and the calculous, leaving aside infectious icterus gravis accompanied by profound lesions of the liver which terminates speedily in death.

Etiology.

Catarrhal icterus is not rare in dyspeptic and rachitic children, in whom there is frequently abnormal fermentation of food in the digestive tract. In these cases the point of departure of the icterus is a gastroenteric septicæmia with invasion of the biliary passages by the bacterium coli commune.

Sometimes we see icterus, especially in timid girls, follow a fright (emotional icterus).

In cases of biliary lithiasis icterus is occasioned by obstruction of the ductus choledochus; this form of icterus is preceded by severe pain (gall-stone colic).

Grave infectious icterus, of which I have recently seen an example in a girl of five and one-half years, acts like an acute disease, being accompanied by fever and prostration; the biliary passages are not obstructed and the fecal discharges are not decolorized. The infectious agent acts upon the liver directly (acute yellow atrophy of the liver) and the child dies from poisoning.

True epidemics of icterus, attacking several children of one family, one house, or one village, have been reported.

Symptoms.

In all cases the icterus is more or less pronounced, the mucous membranes are yellow like the skin, the urine is the color of mahogany and contains biliary pigments, as may be shown by the usual tests. The pulse is sometimes slow and irregular, sometimes normal, sometimes accelerated; the temperature also varies, and in some cases there may be fever, in others not. Constipation is the rule, the tongue is coated, the appetite diminished, and the thirst increased.

Often the liver is found to be enlarged, and is sometimes enormous, reaching even to the umbilicus; it is smooth, painless, and of normal consistence. This hepatic engorgement, which very often ac-

companies the catarrhal icterus of children, is not lasting, and disappears quite promptly upon the institution of proper treatment. The spleen is not ordinarily increased in volume.

Prognosis.

Simple catarrhal jaundice always gets well, and usually quite rapidly, in from two to four weeks. The icterus due to the passage of a gall-stone usually subsides in about the same time. Grave infectious icterus indicates the existence of a diffuse parenchymatous hepatitis and is almost always fatal.

Treatment.

We should insist from the first upon a milk diet, and should administer purgatives and intestinal antiseptics. As a combined emetic and purgative we may prescribe a mixture of seven grains each of ipecac and scammony to be taken in a half glass of sweetened water or weak tea. We may also give 2½ to 4 drachms of sulphate of sodium in water. After the purgation of the first day we may give in a little milk four or five powders containing gr. iiiss. each of salicylate of sodium, calcined magnesia, and benzonaphthol. Vichy water may be added to the milk, and alkaline baths (six ounces of bicarbonate of sodium to the bath) may be given. When the liver is enlarged I give every morning for eight or ten days from gr. $\frac{1}{3}$ to $\frac{1}{2}$ of calomel. If the icterus persists we may try large rectal irrigations with cold water, as recommended by Krull and Kraus.

When there is hepatic colic with jaundice from complete obstruction of the choledochus, we may order glycerin (5 to 8 drachms in an ounce of peppermint water) or olive oil (an ounce to an ounce and a half). At the same time the child should be taken to some spa of the class of Vichy, Vals, Pougues, or Carlsbad.

Children suffering from infectious icterus should be isolated, as such cases are very possibly contagious.

Cirrhosis of the Liver.

Chronic interstitial hypertrophic or atrophic hepatitis is quite rare in childhood, but a number of cases (in the neighborhood of one hundred) are now on record, not to speak of cases of amyloid or fatty degeneration, cold abscess of the liver, cysts, adenomata, etc.

Etiology.

Alcoholism, the great cause of cirrhosis in adults, naturally is less frequently an etiological factor in the disease as it occurs in children, in not more than one-fourth or one-fifth of the cases at the most. In

some instances it has seemed to be due to the abuse of alcoholic medicinal preparations, leading at first to gastritis and later to chronic hepatitis.

Hereditary syphilis plays a rôle of almost equal importance with alcoholism. Malaria may act as a cause, and we must also mention tuberculosis which may occasionally lead to a double process, namely, fatty degeneration of the hepatic cells and sclerosis of the portal spaces. In the previous history of the case mention is often made of several acute infectious diseases, among which are measles, scarlet fever, smallpox, diphtheria, and typhoid fever. These act perhaps through an ascending biliary infection. Other diseases which have been accused of leading to hepatic cirrhosis are duodenitis (Gordon), congenital obstruction of the ductus choledochus (Gibbs); burns of the abdomen, cold, and trauma have also been said to cause the disease.

Pathological Anatomy.

The liver may be enlarged (hypertrophic cirrhosis with or without jaundice) or reduced in size (atrophic cirrhosis), its weight being often less than 500 gm. ($1\frac{1}{10}$ lbs.).

In the atrophic cirrhosis of Laennec, a section of the liver is yellow in color, studded with granulations and nodules, some miliary in size, others being as large as a pea or a filbert. The organ is hard in consistence, and fibroid bands are seen here and there enclosing little islets of hepatic tissue. There are often deep depressions on the surface, the gland looking as if it were trussed; this is seen especially in the sclero-gummy syphilitic liver. In some cases we find a liver which is fatty and sclerosed at the same time; this is the hypertrophic fatty sclerosis of Hutinel, who found it in tuberculous children.

Another form observed in children is the hypertrophic biliary cirrhosis with chronic icterus of Hanot, a peculiar type characterized by an enlarged liver, very little ascites, and permanent jaundice; in this form there is hyperplasia with engorgement of the biliary canaliculi, the spleen is enlarged, and the kidneys may also be altered.

Symptoms.

The beginning of the malady is slow and insidious. There are sometimes preliminary attacks of jaundice; then ascites appears, the abdomen enlarges, the cutaneous veins are dilated, and palpation gives the fluctuation; there are digestive troubles, and alternating diarrhœa and constipation. The urine is scanty, dark colored, sometimes a brick red, and may contain albumin; the albuminuria varies

in amount, but may occasionally be excessive. In the case of two children suffering from hypertrophic cirrhosis, probably of hereditary syphilitic origin, I saw repeated attacks of inflammation or congestion of the kidneys as manifested by the excretion of from 2 to 5 gm. of albumin to the litre of urine. On puncture of the abdomen in cases of cirrhosis we obtain a clear straw-colored fluid in greater or less amount (two to twelve pints or more). This fluid is free in the peritoneal cavity, and follows the patient's movements. As it increases in quantity the diaphragm becomes displaced upwards, the lungs are impeded in their movements, respiration becomes difficult, and the child is threatened with asyphxia or syncope. Little by little the cachexia increases, the liver no longer performs its glycogenic, urogenic, and antitoxic functions, and the child becomes marasmic, presents spots of purpura on its extremities, has melæna and epistaxis, and sometimes the scene is terminated by malignant jaundice.

The progress of the disease is slow, cirrhosis being an eminently chronic affection, and its duration may be from six months to two or three years.

The prognosis is very grave, but recovery is possible when syphilis is the cause.

Diagnosis.

At the beginning we may be led to think of tuberculosis of the peritoneum or of the mesenteric glands, but the increasing amount of the fluid, its mobility, and the development of the collateral circulation soon bear evidence of the fact that the portal vein is obstructed and that the liver is the seat of the trouble. We may exclude the influence of any cardiac affection by careful auscultation. Tumors of the abdomen may be recognized by direct examination.

The fact of cirrhosis being established, the cause remains to be determined. We may suspect that this is hereditary syphilis when we see the stigmata of the affection (Hutchinson's teeth, interstitial keratitis, etc.), and we should then examine the testicles; if one or the other of these organs is found to be indurated and sclerosed, we ought at once to institute an antisyphilitic treatment. A careful inquiry into the history will enable us to decide whether alcoholism enters into the causation. We may decide, after learning in what country the patient has resided, and the climatic and telluric conditions ruling there, whether malaria has had a part in the production of the cirrhosis. Tuberculosis may be recognized or suspected after a thorough examination of all the viscera, especially of the lungs and lymphatic glands, and from the family history.

Treatment.

Every child affected with cirrhosis of the liver should be treated as if he had tertiary syphilis, by means of iodide of potassium and mercurial inunctions. This is almost the sole chance of a cure. Puncture, a palliative measure sometimes necessitated by the abundance of the effusion, should be postponed as long as possible. The child is to be placed on a milk diet, and we may prescribe purgatives and diuretics. Calomel may be given in doses of gr. $\frac{1}{6}-\frac{1}{3}$ every morning for a week. The use of alcoholic beverages should be absolutely forbidden during the entire course of treatment. If we have occasion to suspect the presence of malaria quinine should be given.

As a measure of prophylaxis we should be very careful in our prescription of alcoholic medicaments in the diseases of childhood.

Tumors of the Liver.

Etiology.

Hydatid cysts are the most common of the tumors of the liver met with in childhood; adenomata, sarcomata, and carcinomata are of very rare occurrence at this period of life. It is only in later childhood that hydatid cysts begin to be encountered. Archambault reports a case in a child of three and a half years, and Pontou[26] reports seven cases out of twenty-two occurring in children of eight and nine years. But many cysts which are encountered in adolescents and adults were contracted in childhood, their development being very slow. Hydatid cysts, which are due to the tænia echinococcus of the dog, are of frequent occurrence in Iceland; the eggs are ingested in the drinking-water, the embryos are hatched in the stomach, and make their way into the portal vein whence they reach the liver.

Pathological Anatomy.

The cyst has its seat of predilection in the right lobe, and projects anteriorly where it is very accessible, or towards the diaphragm or the hilum of the liver where it is not so accessible. The cyst may have one, two, or three lobes, but it is not alveolar. The wall is thick and adherent to the neighboring parts; the contained fluid is clear as spring water and in it are found hooklets and daughter cysts; it is not albuminous, but may occasionally contain pus or bile.

Symptoms.

The beginning of the affection escapes our observation, for the first phases of germination and cyst formation are without symptoms and the parasite gives no clinical signs of its presence until a tumor has formed. When the cyst projects from the anterior convexity of the liver the abdominal wall is raised and we may sometimes obtain fluctuation and the hydatid thrill. Frequently there are symptoms of hypertrophy *en masse* of the liver, without pain, fever, or disturbance of the general health; these negative symptoms will lead us to think of a possible cyst, and an exploratory puncture will settle our doubts.

When the tumor develops posteriorly or from the upper surface it pushes up the diaphragm and compresses the right lung, causing dyspnœa and simulating pleurisy. When the cyst develops in the deeper parts, at the hilum, it is inaccessible, but it may give rise to jaundice and ascites through compression of the ductus choledochus and the portal vein.

Other symptoms which have been noted in connection with hydatids of the liver are digestive troubles, anorexia, dyspepsia, emaciation, pallor, and epistaxis. The cyst may break into the lung, the intestine, or the peritoneum. The latter is a very serious complication. The disease is chronic and interminable; it menaces life by its complications, such as suppuration, septicæmia, obstruction of the portal vein and of the biliary passages, pleurisy, and peritonitis.

Diagnosis.

A probable diagnosis may be made by physical examination, but certainty will usually rest only upon the results of exploratory puncture and examination of the fluid so obtained. If fluctuation is distinct there is no need of puncture to establish the diagnosis. The nature of the case will also be beyond doubt if a child suffering from enlarged liver has expectorated hydatids. When the tumor projects toward the pleura the flatness will be limited at its upper border by a curved line with convexity pointing upwards.

Treatment.

The question of treatment of hydatid cysts of the liver has been much discussed in recent times. We cannot rely upon medical treatment; iodide of potassium has been given without the slightest result. Surgical treatment, which alone is successful, may consist in simple capillary puncture with aspiration and complete evacuation of

the cyst, but the preferable operation is to evacuate the cyst only partially and then inject an antiseptic fluid capable of destroying the hydatids: for this purpose we may use corrosive sublimate solution, 1:1,000, of which not more than 5 or 10 c.c. (1 or 2 drachms) must be injected in order to avoid all danger of poisoning. If this does not succeed we must perform laparotomy and attack the tumor directly.

DISEASES OF THE GENITO-URINARY ORGANS.

The pathology of the kidney was greatly simplified when Bright, in 1827, showed the relations which exist between albuminuria and nephritis. However, albuminuria may exist without nephritis, as a result of some dyscrasia, blood lesion, or degeneration of the kidney. We might, therefore, distinguish dyscrasic forms of albuminuria without appreciable lesion of the renal epithelium, and nephritic albuminuria directly dependent upon lesions of the kidneys.

Intermittent Albuminuria.

When we examine the urine of a large number of healthy children systematically, we find in some a slight albuminuria which varies in intensity at different hours of the day and under different conditions of fasting, fatigue, etc. The proportion of these cases of albuminuria varies much according to different authors; among 97 children from 18 months to 8 years of age, Capitan found 38 cases of albuminuria; in 142 between 6 and 15 years, Chateaubourg found 111; but in 330 Leroux found only 19, that is to say only 1 in 17. This albuminuria, which is called physiological, may exist in the midst of perfect health; it does not imply the existence of a lesion of the kidneys, of true Bright's disease; it is a purely functional trouble.

At about the time of puberty we may observe a more serious and less transitory form of albuminuria, called sometimes Pavy's disease, which, according to Merley and to Teissier, of Lyons, is met with only in feeble, exhausted, lymphatic subjects of a neuroarthritic stock. This albuminuria is cyclic; it does not exist in the early morning, but appears during the day after eating; it is accompanied sometimes by an excessive excretion of urea. The urine contains no sediment, neither epithelium nor renal tube casts.

Symptoms.

The symptoms are vague; we sometimes observe malaise, lassitude, inertia, backache, palpitations, vertigo, headache, sweating, and dyspepsia. The urine shows an increased excretion of coloring

matters, of urates, urea, and albumin. Rest in bed prevents the excretion of albumin. In one case it was found that, during the three weeks that the patient, a young girl, was kept in bed, albumin appeared in the urine but once. Pavy observed the same effect of confinement to bed in the case of a girl of eleven years and in another of a boy of thirteen years.

This malady, which is easily overcome by simple measures, relapses readily under the influence of fatigue, cold, an error in diet, or some emotion.

Treatment.

These little subjects of albuminuria should be treated by a good dietary regimen, in which alcoholic beverages, dark meats, and highly seasoned food are to be excluded, milk being the chief article admitted. The action of the skin is to be promoted by dry frictions. A cure will be hastened by a course of the waters at Ragatz in Switzerland, or at St. Nectaire in France.

Nephritis.

Nephritis is said to exist when the kidney is injured in its nobler parts, in the glomeruli or the convoluted tubes, that is to say, in the part through which the urine filters. There may be fatty or amyloid degeneration of the organ, sarcomatous or cystic tumors, tuberculosis, or syphilis, without there being primarily an inflammation, and the disease does not then merit the name of nephritis.

Etiology.

We never find, or at most exceptionally, in the child, the common causes of nephritis in the adult, such as alcoholism, over-feeding, and arterial atheroma. But we have the infectious diseases, cold, and poisoning with cantharides, the balsams, or chlorate of potassium. Acute nephritis may follow scarlet fever, diphtheria, smallpox, chickenpox, typhoid fever, mumps, measles, malaria, whooping-cough, pneumonia, cerebrospinal meningitis, influenza, infectious enteritis, etc. Syphilis, tuberculosis, and scrofula more commonly cause chronic nephritis and amyloid degeneration. Certain forms of skin eruptions, such as eczema and impetigo, may be followed by nephritis. All these forms of acute nephritis, which may get well rapidly or pass into a chronic state, are produced by the same mechanism; they result from the passage through the kidney of pathogenic microbes or of the toxins secreted by them. The kidney is the great emunctory of the body and is thus menaced in all the infectious diseases and intoxications.

Pathological Anatomy.

In the child, as in the adult, there have been found the small contracted kidney of interstitial nephritis, and the large white kidney of parenchymatous nephritis. The contracted kidney is very rare but some undoubted cases of it have been reported. Handford [27] saw a girl of twelve years who had had measles at the age of three and a half and scarlatina with œdema at four, who had a typical interstitial nephritis; at the autopsy the right kidney weighed 60 gm., the left only 15, and the heart 280. Hale White also saw a small granular kidney (70 gm.) with a large heart (280 gm.) in a child ten years old. Dickinson reports similar cases, and Rayer has seen them even in the fœtus.

The following is the usual sequence of events: The kidney enlarges, the affection beginning with parenchymatous nephritis; then it atrophies (interstitial nephritis) and the left heart increases in volume. In parenchymatous nephritis the kidney is enlarged and white or red according to the case; the capsule is not readily stripped off; the cells of the tubules and glomeruli are swollen, deformed, granular, and the vessels are gorged with blood; in mild cases the lesions appear to be limited to the tubes of Bellini, but in grave cases they invade the convoluted tubules (Lécorché). Most authors, however, believe that the lesions are always diffuse, that there is a glomerulonephritis with variations in intensity. Can glomerulitis exist alone? According to F. Fede, of Naples, if an examination of the urine shows casts and leucocytes without epithelial cells we may regard this condition as present. Anatomically the amyloid kidney may be distinguished by its softness, its grayish color, and a mahogany color turning to violet when treated with tincture of iodine and sulphuric acid.

Symptoms.

Acute nephritis may begin quietly or with most marked symptoms, but the urinary analysis is of more value than the objective or subjective symptoms. Micturition is more frequent than in the normal state, but the amount of urine is decreased, it is dark in color, and deposits a sediment in which are found casts formed by desquamation of the epithelium of the tubules. Sometimes there is complete suppression of urine, temporary anuria. In some cases the child complains of pains in the head and in the lumbar region, and there is œdema of the face, eyelids, extremities, prepuce, scrotum, etc.; the œdema may, however, be absent or limited to the face and scrotum. Generalized œdema, or anasarca, is seen chiefly in scarlatinal nephri-

tis. It may invade the mucous membranes (œdema of the glottis), the serous membranes (hydrothorax, hydropericardium, ascites, or œdema of the brain), or the parenchymatous tissues (lungs, kidneys).

When these symptoms are present we have to fear the nervous accidents of uræmia, such as delirium, coma, convulsions, dyspnœa, amaurosis, and vomiting. The urine contains albumin to the amount of 4, 5, or 10 gm. per litre. The albuminuria may vary from day to day, and in a case of simple acute nephritis I have seen it fall in the course of a week from several grams to zero. At the same time that the albumin disappeared the peripheral and visceral œdema subsided and the child recovered. Acute nephritis may also get well rapidly and completely under the influence of a proper diet and appropriate treatment. But relapses are not uncommon and the disease may pass into a chronic condition.

Chronic Nephritis.—It is this which constitutes Bright's disease, properly speaking; it is much more grave than the acute form and its cure is very difficult. Anasarca is absent or but little marked; the child is usually pale but not swollen. The urine is neither scanty nor dark colored, but is often very clear and very abundant; it contains but little albumin. The patient fails in strength, has palpitation, dyspnœa, headache, and digestive troubles; gradually he falls into a condition of progressive cachexia, which is inexplicable except by the results of a urinary examination. The heart is normal (parenchymatous nephritis), or it may be hypertrophied and auscultation will reveal a doubling of the first sound (*bruit de galop*) which indicates hypertrophy of the left ventricle associated with interstitial nephritis, or sclerosis of the kidney.

At the end of a certain period uræmic symptoms gradually appear, the respiration is embarrassed, there is headache, the heart is weak, and death occurs in coma or convulsions. Sometimes the progress of the disease is precipitated by some inflammatory complication, such as pleurisy, pericarditis, or pneumonia. Acute nephritis has a short duration, counted by two or three weeks, but chronic nephritis on the contrary may last for months or years, the duration often being indefinite, since the beginning of the disease may escape our notice.

Prognosis.

The prognosis of acute nephritis is less grave than is that of the chronic form. Most cases of acute nephritis get well, and they seldom survive the diseases which have caused them. All forms of nephritis, moreover, are less grave in the child than in the adult. I have seen a child of twelve years who had suffered for a long time with

scarlatinal nephritis, with *bruit de galop*, and frequent attacks of acute kidney trouble, as shown by blood in the urine, who was cured after some months of treatment; both the *bruit de galop* and the albuminuria disappeared. Nevertheless death is a rather frequent sequel of nephritis, even in children. Rilliet and Barthez reported 60 deaths out of 188 cases, 1 death in 4 cases of acute nephritis, 20 in 25 of chronic nephritis. When uræmia is present the prognosis is more serious; in 14 cases of uræmia Sanné noted 4 deaths. The prognosis varies according to the cause of the nephritis. Although scarlatinal nephritis seems most commonly to result in recovery, nevertheless it may cause anxiety for the future, and it is possible that many cases of chronic nephritis in the adult may be referable to this affection in childhood. When the albuminuria is due to amyloid degeneration, death almost always occurs.

Diagnosis.

The diagnosis of nephritis rests especially upon an examination of the urine, which shows the presence of albumin, casts, epithelial cells, red and white blood corpuscles, etc. The existence of a nephritis is rendered more certain by an abundance of albumin than when there is only a slight cloud, which may occur in dyscrasic conditions. Interstitial nephritis is differentiated from the other varieties by signs of hypertrophy of the left ventricle (*bruit de galop*), the abundance and limpidity of the urine, and a small amount of albumin.

Treatment.

We should treat acute nephritis by prolonged confinement to the bed; by repeated purgation with castor oil, calomel, scammony, or the like; by an absolute milk diet which favors diuresis and reduces the number of intestinal toxins; by lumbar revulsion with dry- and wet-cups; by general friction of the skin, and by inhalations of oxygen. We must endeavor to remove anasarca or serous effusions by means of purgatives, diuretics, the hot-air bath, or injections of pilocarpine. When uræmic accidents supervene we may bleed from the arm or apply leeches to the mastoid processes, give a purgative enema, or possibly an intravenous injection of artificial serum (sterilized water containing in solution 5 gm. of chloride of sodium and 10 gm. of sulphate of sodium per litre).

In chronic nephritis we must prescribe iodide of potassium or of sodium, iodotannic syrup, tannin or gallic acid. Large enemata of cold water are useful in cases of anuria.

When a milk diet is not well borne and produces no good effect we

must resort to other articles, such as bread, farinaceous vegetables, boiled beef, and some white meats, but no beef tea, no roast meat, and no meat juice. Patients with chronic Bright's disease should be vegetarians.

Perinephritis.

Perinephritis or perinephritic phlegmon is a disease of uncommon occurrence in childhood; it is often preceded by renal lithiasis, tuberculosis, or sarcoma; it may likewise follow an injury. Buscarlet[28] has reported a case of perinephritic phlegmon in a child twenty months old who fell from a high bed to the ground. After a few days any attempt to raise it by the arms made it cry; one month after the fall fever appeared and the urine became dark colored and bloody; a month later there was hectic fever indicating suppuration, the lumbar region was swollen, and the child was emaciated, seeming to be suffering from tuberculosis. The physician, who was not called until two months after the accident, found fluctuation in the left lumbar region, with a swelling extending from the angle of the scapula to the iliac crest. A puncture gave exit to a pint and a half of pus; the abscess having reformed, an incision was made and a sac was found surrounding the left kidney. The abscess was washed out antiseptically and recovery ensued.

Renal Lithiasis.

Renal calculi are rare in children, but they may be found in the tubes and in the pelvis of the kidney during the first months or years of life, and I have, in a number of autopsies, found gravel which had given rise to no symptoms during life.

Etiology.

Parrot has described the yellow streaks in the kidney formed by uric sand in the tubes of Bellini. These concretions form during fœtal life and are washed away by the urine, but in cases of athrepsia they may persist and cause anuria.

Gravel may be found in infants who are fed on too much nitrogenous food. A. Robin saw a child of seventeen months who had nephritic colic and passed red sand as a result of being fed on meat, fat soups, and goat's milk. Recovery followed the institution of a proper diet.

Gravel is less uncommon in older children, especially those who are fat and of arthritic stock. I have seen a boy eight years old who passed gravel and sand; his mother suffered from migraine, and he did also. The physicians of Contrexéville see quite a number of

instances of this kind, and Debout d'Estrées has reported thirteen cases of the sort to the Paris Academy of Medicine. The inanition fever of the new-born who are badly nursed (Emmett Holt [29]) may perhaps be explained by the presence of uric-acid calculi (Jacobi), for it disappears after the ingestion of milk or water. The concentration of urine which results from profuse diarrhœa may be a cause of renal gravel. Eichhorst twice observed in his child of ten years attacks of nephritic colic with expulsion of calculi, occurring after acute enteritis. We must also, in this question of infantile renal lithiasis of children, take into consideration family and race and possibly also climate. J. Bókai [30] has shown that renal calculi in children are frequent in Hungary.

Pathological Anatomy.

The uratic infarcts of the new-born occur in the form of yellow or orange rays, due to the presence of urate of ammonium, uric acid, and epithelial cells. They are located in the tubes of Bellini and are found in the infant's napkins under the form of reddish granules. They may be arrested in the bladder and become later the nucleus of vesical calculi.

Ordinary calculi are formed of uric acid in the shape of sand or little angular stones; they occupy the tubes and the pelvis, and frequently cause an irritation of the mucous membrane (pyelitis, pyelonephritis). But these inflammatory complications are rare in children, although vesical calculi are relatively less uncommon at this age.

Symptoms.

Nephritic colic exists in childhood as it does later, but it is less severe and is usually limited to a few lumbar pains, radiating into the abdomen; it is sometimes accompanied by vomiting and convulsions. The urine, which is scanty during the attack, later becomes abundant and deposits a sediment of red sand or fine gravel. The stones may be arrested in the urethra or at the orifice of the prepuce, and anuria and hydronephrosis have been observed as a result of obstruction of the ureter, even in the fœtus.

The *prognosis*, which is moderately good for the present attack, is less favorable for the future.

Diagnosis.

The diagnosis is rather difficult for the reason that we are not accustomed to encounter this malady in childhood. In the new-born the pain, as indicated by crying at the time of micturition, the nar-

rowness of the stream of urine, and the presence of sand in the diaper will point to uric-acid infarcts. Later the lumbar pain and the dysuria should arouse suspicion, especially in the case of obese and arthritic children; the passage of a catheter will sometimes give us useful information.

Treatment.

A large amount of fluid, such as milk and Contrexéville water, should be given, and prolonged hot baths are indicated during the attacks. But little nitrogenous food should be allowed, and the child should abstain from red meats, highly seasoned food, alcohol, spinach, tomatoes, asparagus, etc. A temperate diet, physical exercise, and the observance of a good hygiene will avert subsequent crises.

Pyelitis and Pyelonephritis.

Inflammation of the pelvis of the kidney may be spontaneous or secondary to the presence of calculi, to tuberculosis, or to the action of certain poisons, as after vesication by cantharides.

Etiology.

Pyelitis is a common result of renal lithiasis. It is more common in boys than in girls. It may exceptionally be due to the presence of a parasite, eustrongylus gigas or echinococcus. The balsams, copaiba or turpentine, carbolic acid, salol, salicylic acid, and especially cantharides may provoke it. It may result from extension of the inflammatory process in vulvovaginitis of young girls. Finally we may mention infectious diseases, influenza, smallpox, scarlet fever, diphtheria, tuberculosis, etc., among the causes of pyelitis.

Sometimes none of these causes can be detected, and L. Emmett Holt[31] has reported three cases of spontaneous pyelitis in children of eight, nine, and fourteen months.

Pathological Anatomy.

In an anatomical sense we may describe a catarrhal pyelitis without exudation but with congestion of the mucous membrane, a membranous pyelitis (from cantharides), and a suppurative pyelitis with more or less grave secondary lesions in the kidneys. I found, in a child of ten years who had died suddenly after having had polyuria with a slight cloud of albumin in the urine, a tuberculous pyelonephritis on the right side with destruction of the kidney, which was reduced to a mere shell filled with pus; the ureter was dilated and infiltrated with tubercles, but the bladder was but little affected. In a

girl of the same age who passed cloudy urine which deposited a thick layer of pus, the pyelonephritis formed in the left side a tumor of considerable size which it was necessary to open and wash out.

Symptoms.

The disease may begin with chills and fever, a sort of intermittent fever with evening exacerbation. At the same time the child complains of pain in the region of the kidney radiating towards the bladder, of tenesmus, and sometimes of vomiting and diarrhœa. Thirst is excessive and the tongue is dry and coated (urinary infection). If the disease is prolonged, the child grows pale, emaciated, and weak.

The characteristic symptoms are drawn from an examination of the urine; this is usually scanty, very acid, and contains pus, mucus, red blood corpuscles, epithelial cells, and bacteria. On microscopical examination we often find renal casts. There is usually marked albuminuria. Sometimes the pyuria disappears, the ureter being blocked by a calculus, a clot, or detritus of some sort, and the kidney on the other side alone acts. In this case the region of the diseased kidney becomes swollen and painful. The child may succumb with uræmic symptoms or as the result of infection and cachexia.

Pyelitis has a variable progress, acute, relapsing, or chronic, according to the cause. In the children seen by Emmett Holt fever appeared suddenly, the urine became scanty and dark colored, throwing down an opaque deposit, with pus and epithelial cells but without casts; then the pus gradually diminished, and the disease was at an end in two or three weeks.

The *diagnosis* rests entirely upon an examination of the urine.

The *prognosis* depends upon the cause.

Treatment.

This consists of rest in bed, a milk diet, warm baths, and the drinking of Vichy water. Holt gave citrate of potassium (gr. iss. every two hours) to the infants under his care. To a patient living in a malarious region we should give quinine. In the chronic forms we may try a course of mineral waters, such as those of Contrexéville.

Paroxysmal Hæmoglobinuria.

In this affection there is a discharge in the urine of dissolved hæmoglobin instead of red blood cells. It was described in the adult by Harley and Pavy (1865, 1866), then by Mesnet and Hayem. Paroxysmal hæmoglobinuria is seen also in childhood, and I reported several cases of the kind in an article published in 1895 in *La Médecine Infantile.*

Etiology.

Paroxysmal hæmoglobinuria, called *à frigore* because its attacks are excited by cold, occurs in infancy and later in childhood, in girls and in boys. Among the causes which have been alleged are malaria and hereditary syphilis; in three of my patients there were stigmata of the latter affection, and improvement followed the use of iodide of potassium. Soltmann, Courtais-Suffit, and Goetz have also seen cases due to hereditary syphilis. Indeed the two chief factors in the production of paroxysmal hæmoglobinuria are cold and syphilis. As long as the children are kept warm in bed the attack does not appear, but as soon as they go out into the cold air it comes on. How does cold act? The red color of the urine indicates a destruction of the red blood corpuscles which occurs either in the bladder, in the kidney, or in the blood itself. Küssner found hæmoglobin dissolved in the blood and so also did Lépine (a ruby red blood-serum); there was therefore hæmoglobinæmia. But Hayem did not find this red color of the serum, and he believes that the destruction of the blood cells takes place in the kidney under the influence of cold which causes, through reflex action, a congestion of these organs.

Symptoms.

The attack begins suddenly by a chill or a series of chilly sensations, and by cyanosis or pallor of the extremities, and when the child micturates the urine is seen to be of a dark color resembling Bordeaux or Malaga wine, coffee, or chocolate. At the end of twenty-four to thirty-six hours the attack ceases and the urine gradually becomes clear. During the attack the thermometer may register from 38° to 39° C. (100° to 102° F.), but the fever disappears with the subsidence of the paroxysm, to return with a new attack recurring at a longer or shorter interval after exposure to cold or fatigue. In the case of a little girl in my service the attack recurred whenever she left the bed, even although she did not leave the warm ward where she slept. The hæmoglobinuria may be complicated not only by cyanosis and local asphyxia of the hands and feet, but also by œdematous and hemorrhagic swellings (Joseph).

A microscopical examination of the urine shows an absence of red blood corpuscles, but in the spectroscope the lines of hæmoglobin are visible. In some cases there is albuminuria. At the time of the attack the number of red blood corpuscles is diminished. In the case of a little girl under the observation of Goetz, the red cells numbered only 1,200,000 during the attack, 2,500,000 in the interval, and 4,000,000 after treatment.

The disease is of rather long duration, lasting sometimes for years; in summer the health appears to be excellent, in winter it declines.

The *diagnosis* is easy. The absence of red blood corpuscles in the urine enables us to exclude hæmaturia or acute nephritis. A spectroscopic examination enables us to affirm the presence of hæmoglobin.

Treatment.

The child being pale and anæmic, the indication is for cod-liver oil, iron, arsenic, dry frictions, and sulphur baths. In malarious regions we may give quinine in moderate doses (25 to 50 cgm.—4 to 8 grains—a day), but for long periods of time. In all cases we should hope much from antisyphilitic remedies—mercurial inunctions and iodide of potassium. When the affection is at its height the children should be kept in bed; they should be made to wear flannel, and should not be permitted to go out of doors in cold weather; they should also be placed on a milk diet.

Tumors of the Kidneys.

The kidney, in the child, may be the seat of various neoplasms. Tubercle is met with in the pelvis, the tubules, the renal parenchyma, or the suprarenal bodies (Addison's disease); sarcoma and carcinoma are rather common; we may also encounter hydatid cysts, congenital cysts, and hydronephrosis. Movable kidney is also seen occasionally. I have recently seen four such cases in little girls who suffered from very great dilatation of the stomach.

Etiology.

The cystic kidney may occur in fœtal life, and may then be a cause of dystocia, of which Joulin reports six cases, the cysts having formed at the expense of the tubes or glomeruli. Cysts occurring later may be due to hydatids or to obstruction of the ureters (hydronephrosis). Sarcoma of the kidney is frequent and may be observed in earliest infancy. In thirty-seven cases (Windler) five children were less than one year of age, fifteen less than two years, and in one case the tumor dated from intrauterine life.

Symptoms.

Cysts occur as fluctuating tumors, projecting either anteriorly or posteriorly, painless, and giving no sign in the urine. In sarcoma there may be bloody urine, pain, fever, and a cachectic state. Of one hundred and six cases of renal cancer collected by George Manges,[32] hæmaturia occurred in forty-eight. These tumors grow rapidly, attain a considerable volume, and cause death in a few months.

Diagnosis.

It is not always easy to recognize the seat of the tumor, and to eliminate neoplasms of the liver, of the spleen, or of the mesentery. In the case of fluid collections, fluctuation and the result of exploratory puncture will serve as guides to the diagnosis. In the case of sarcoma the tumor is hard and nodulated.

Treatment.

When a cyst is present we must puncture it. In the case of sarcoma early extirpation is to be tried and has been done by Czerny and many others. Henry Fruitnight [33] treated successfully with erysipelas toxins an enormous sarcoma of the left kidney in a child of thirteen months. The sarcoma weighed four and a half pounds, was seven and three-quarter inches in length, and five and a half and six and a half inches in diameter; it was formed of embryonic cells (rhabdomyoma); an operation was rendered useless by reason of adhesions. J. Bland Sutton advises against operation, basing his conclusions upon a study of twenty-one cases; twelve of these children died of the operation, and nine others died during the first year, most of them within six months after the operation. Görl removed the right kidney eight months after the beginning of a sarcoma, and the child was well two months after the operation. Emmett Holt saw a child from whom a sarcoma, weighing seven pounds, had been removed when it was thirteen months old; the child was well sixteen months after the operation; he saw a similar case in a child of ten months. Jacobi advises early operation, for the results are usually bad when the operation is performed late.

Polyuria.

Polyuria, or diabetes insipidus, is characterized by the secretion of an excessive quantity of clear urine, containing little solid matter, but which may be complicated with azoturia or phosphaturia.

Etiology.

Polyuria, which is a nervous disease, a urinary neurosis, is a result of polydipsia, according to Bouchut and Guéneau de Mussy. It is of exceptional occurrence in infants, but less rare in older children, and is met with in boys and girls alike. Its exciting causes are emotions, fear, cold, some acute disease, or a fall on the head. The predisposing causes are a neuropathic heredity, hysteria, or insanity in the ancestry. I have seen marked polyuria in children following an attack of typhoid fever.

Symptoms.

The onset of the disease is sudden, especially when it follows a fright or an injury to the skull. We find insatiable thirst, even during the night, frequent micturition, and dryness of the skin, mouth, and lips. The amount of urine varies from five to ten quarts a day, the quantity passed at night being less than that during the day; the specific gravity is low (1.004 to 1.001), the color is pale, the reaction is neutral or very slightly acid; there is no increase in urea, and the urine contains neither albumin nor sugar. The appetite is preserved. The stomach is sometimes dilated because of the excessive amount of fluid ingested, and the bladder may also be dilated. Constipation is the rule. The temperature of the body is usually reduced.

Prognosis.

The duration of the disease is very long, but it may be cut short by some intercurrent acute malady. A cure is possible when the cause is accidental, but it is doubtful when the malady is hereditary. Polyuria is not in itself a fatal disease, hence the prognosis as regards life is good.

Diagnosis.

Polyuria declares itself by very evident signs, but an examination of the urine is necessary to distinguish the affection from diabetes mellitus, azoturia, phosphaturia, and chloruria. It is necessary to remember that there may be a transitory polyuria in the convalescent period of many acute diseases (critical polyuria), that the affection may depend upon the presence of a cerebral tumor, or that it may be symptomatic of chronic nephritis.

Treatment.

Action upon the skin by means of frictions or hot baths is indicated. The child should be built up by cod-liver oil, quinine, iron, and the bitter tonics. We should prescribe rest in bed, heat externally, and hot drinks. Opium, antipyrin, strychnine, belladonna, valerian, quinine, and ergot have been tried in rather large doses. In some cases hypnotic suggestion has given good results.

Nocturnal Incontinence of Urine.

Enuresis nocturna is another urinary neurosis, which is manifested by the involuntary discharge of urine during sleep and sometimes during the waking hours also; the incontinence may therefore be diurnal or nocturnal, and it may extend in certain cases to the rectum.

Etiology.

As a general rule no anatomical cause, no malformation can be found for the malady. It is a neurosis of growth occurring in children of nervous heredity who have often other stigmata, such as chorea, strabismus, hysteria, epilepsy, convulsions, night terrors, onychophagia, tics, idiocy, or onanism. The same taint, and possibly also alcoholism, may be found in one or more of the ascendants.

Trousseau thought that nocturnal incontinence of urine might be a larval form of epilepsy, but it is not so ordinarily. In some cases anæsthesia of the larynx has been observed, and I have seen a little girl of ten years, suffering from nocturnal enuresis, who had insensibility of the pharynx and entire buccal cavity. Boys are more often affected than girls.

Before making a diagnosis of essential enuresis we must assure ourselves that the child is not suffering from a stone in the bladder, from seat worms, or preputial or clitoridean adhesions which might cause the affection by reflex action. Usually the condition present is atony of the sphincter and not spasm of the bladder.

Symptoms.

The children have every appearance of health, but wet the bed frequently or every night. The malady may present remissions of longer or shorter duration, but it may continue for an indefinite period before actual recovery takes place. It may last from the age of five or six years to puberty or even longer; sometimes in women the disease may be brought to an end by pregnancy. Acute intercurrent diseases suspend the incontinence for the time being.

The *prognosis*, while good as regards life, may be rather grave because of the nervous taint of which the disease is an indication.

Diagnosis.

When wetting the bed occurs for the first time we cannot know whether we have to deal with a pure accident, a larval epilepsy, or an essential enuresis. If albuminuria or glycosuria is present we can

refer the condition to Bright's disease or diabetes. We must make sure also that there is no vesical stone, phimosis, paralysis of spinal origin, onanism, or vulvitis.

Treatment.

We may begin by reducing the amount of fluids ingested, especially in the evening, and care must be taken to see that the child passes water immediately before going to bed. No alcoholic beverages are to be allowed. Tonics, such as syrup of iron, cod-liver oil, arsenic, saline and sulphur baths, and sea baths, are indicated. No permanent benefit is to be obtained from narcotics, such as bromides, chloral, or belladonna; but I have seen some good results from antipyrin in doses of from 3 to 5 gm. in the course of two or three hours, given at bedtime. I have pushed strychnine as high as 1 cgm. (gr. $\frac{1}{6}$) a day without any notable results. Ergotin is wholly unreliable. Krauss[34] has spoken very highly of the fluid extract of rhus aromatica in doses of five to ten drops, increased gradually to fifteen to twenty drops four times a day. St. Phillippe, of Bordeaux, has given rhus radicans, and Bissel, of New York, rhus toxicodendron. The direct application of electricity to the neck of the bladder has been highly praised by Guyon. Finally, Liébault, of Nancy, has succeeded in obtaining a cure by hypnotic suggestion.

Spasm of the Bladder.

Spasm of the bladder, described by Bókai, is characterized by a spasmodic closure of the neck of the bladder, accompanied by pain and dysuria, at each micturition. This spasm may be seen in the new-born suffering from uric-acid infarcts, and is then temporary. It is encountered later in nursing infants, in whom the amount of urine has been reduced by a diarrhœa, and any cause which may lead to a reduced quantity and greater concentration of the urine may bring about this condition. Spasm of the bladder may also occur as a complication in cases of myelitis, rectitis, vulvitis, appendicitis, or psoitis.

It is seen that the jet of urine is suddenly arrested at the same time that the child cries lustily. After two or three such attacks recovery usually occurs.

We may give in these cases warm baths, antispasmodic suppositories or enemata, or apply poultices over the region of the bladder.

Cystitis.

Apart from spasm, which does not occur without irritation of the neck of the bladder, and from calculi, we may observe in children true cystitis occurring by extension of the inflammation from above or below. In vulvitis of young girls, as well as in blennorrhagia of boys, the bladder may be secondarily affected, and there will be frequent and painful micturition and perhaps hæmaturia. In certain acute diseases there may be a descending infection. I have seen cystitis with hæmaturia in a boy of twelve years caused by influenza, and tuberculosis of the urinary tract may act in the same way. Escherich, Trumpp, and Hutinel have found the bacterium coli commune in some cases of cystitis of childhood.

In these cases we must prescribe an absolute milk diet, prolonged baths, rest in bed, and sometimes lavage of the bladder.

Vulvitis and Vulvovaginitis.

Inflammation of the external genital organs in young girls is of extreme frequency, and may be due to a variety of causes.

Etiology.

Sometimes there is simple vulvitis, the discharge being moderate in amount and not thick, and the general symptoms being insignificant; there is here an irritation of little importance, due to the presence of the streptococcus, the staphylococcus, or the bacterium coli commune. Sometimes there is vulvovaginitis together with urethritis, and the discharge is then thick and greenish, and the parts are red and swollen; the cause in this case is the gonococcus. The contagion, which is usually innocent, occurs through sleeping in the same bed with an infected person, or through common use of towels, sponges, or other toilet articles in the family. Sometimes the infection may occur from an ophthalmia; at other times it may occur in the bath; or again, an unsterilized thermometer may carry the disease. The gonococcus has been found in the majority of these cases, but sometimes it may be absent, and then the inflammation is due to an injury, to worms, or to masturbation; when due to such causes it is more frequent in lymphatic and scrofulous children. Vulvitis is common as a complication of acute diseases, such as measles, scarlet fever, typhoid fever, or varicella, and may be due to a localization of herpes, impetigo, or diphtheria.

Symptoms.

We distinguish two forms: (1) a mild, superficial, non-contagious form, with slight discharge and moderate irritation, of short duration, and frequently marked by remissions; and (2) a severe form, due to the action of the gonococcus, marked by swelling and redness of the parts, a thick purulent discharge staining the linen, and which may be complicated with vaginitis, urethritis, cystitis, etc. It is in this form that serious complications have been seen, such as gonorrhœal rheumatism (Koplik, Ollivier, Haushalter), salpingitis, and peritonitis. I have seen in these little girls abundant hemorrhages from fungosities at the meatus urinarius accompanied by prolapse of the mucous membrane. The diagnosis of the affection presents no difficulties.

Treatment.

An antiseptic treatment is indicated in the shape of a wash for the vulva or a vaginal injection containing permanganate of potassium, 1:1000. I have sometimes used vaginal suppositories of cacao butter containing creolin, salol, or iodoform, ten per cent. Frequent baths should be given and isolation must be insisted upon. Women who have leucorrhœa should not be allowed to sleep with their little children nor to use the same toilet utensils.

Onanism.

Onanism or masturbation is a perversion of the genital sense which occurs with special frequency in older children, particularly school children.

Etiology.

This vicious habit, which is propagated by imitation, may be acquired spontaneously by degenerate and unbalanced children and those who are predisposed by a nervous heredity. We may then regard it as a tic, analogous to the habit of sucking the thumb or of biting the nails. Lasègue maintained that persistent masturbators are mentally unsound, and that sane subjects are seldom really the victims of this habit. There may exist local causes, such as pruritus of the vulva, preputial or clitoridean adhesions, etc.

Symptoms.

Children given over to onanism, while not sunk in the abyss of misery pictured by Tissot and other writers, may yet have some general symptoms, such as great thirst, anorexia, pallor of the face,

emaciation, languor, debility, insomnia, palpitation, breathlessness, a dry cough, vertigo, gastralgia, dark and gloomy thoughts, or neurasthenia. Sometimes we see an absolute inertia and semi-idiocy with loss of memory, aphasia, hallucinations of sight and hearing, and dilatation of the pupils, all phenomena dependent upon an excessive loss of nervous force. Later these onanists will have spermatorrhœa and impotence. But this picture is seen only in the case of persistent and extreme masturbators; the others receive no serious damage and readily recover.

Treatment.

There is nothing especially to do for those who are not excessive in their addiction to the vice; we must watch over them without seeming to do so and must remove them from the company of bad companions. We must endeavor to divert them by games, physical exercises, and hydrotherapy. In some cases suggestion has succeeded in curing the habit (Voisin). Lawson Tait obtained a cure in the case of a young girl by clitoridectomy. Before resorting to such extreme measures we must exhaust our list of milder ones.

DISEASES OF THE NOSE.

Without entering into detailed description of all the affections which may have their seat in the nasal cavities and which are in the domain of specialists, I shall describe only a few concerning which every general practitioner should be informed.

Foreign Bodies in the Nasal Fossæ.

Foreign bodies in the nose come from within or from without. Those from within are matters rejected by vomiting, particles of food or intestinal worms. Foreign bodies entering from without are of infinite variety, such as beads, pebbles, peas, beans, etc. Vegetable substances may swell from imbibition of moisture and may even germinate. Sometimes the foreign body is well tolerated, giving rise to no painful reflex symptoms; but sometimes it irritates the mucous membrane and causes bleeding or suppuration, and may interfere with respiration and speech. To determine the cause of the symptoms or to inform ourselves of the beginning of the trouble or of the circumstances which have preceded it, we must take account of the fact that the discharge of pus or blood is unilateral. By means of the nasal speculum we may be able to see the foreign body unless it is hidden by swelling of the mucous membrane. Sometimes the

diagnosis is facilitated by a good irrigation of the nostril or by exploration with a sound. In order to facilitate the expulsion of the foreign body the nostril of the opposite side may be forcibly irrigated, the obstructed nostril being first closed and then suddenly opened. Sneezing may be excited by snuff or some sternutatory. If these means fail, the nostril should be illuminated and the foreign body dislodged with a piece of curved wire or with forceps.

Acute Coryza.

Acute inflammation of the mucous membrane of the nasal fossæ (rhinitis) is extremely common at all ages; it is the ordinary "cold."

Etiology.

Cold is the chief cause of acute coryza, whence its common name. The action of cold is especially to be feared in the new-born, who, coming from a warm and sheltered region, are sometimes left too long naked in a room with a relatively low temperature. Later a coryza may be caused by their being taken out in cold weather, by exposure to sudden changes of temperature, or by bathing followed by incomplete drying of the body. Children with a nervous and arthritic heredity are predisposed to acute rhinitis, and in such subjects repeated attacks of sneezing may be excited by passing into the sunlight or by a change from a cold to a warm atmosphere as well as from a warm to a cold one. Some children are anatomically predisposed to coryza, as those who have an ill-formed or unsymmetrical nose. Lasègue speaks of the *coryza des nez bossus.* Many of the infectious diseases, such as influenza, measles, and diphtheria, attack especially the nose.

Coryza is simply a rhinitis, a catarrhal inflammation of the nasal mucous membrane, a congestion with erection of this membrane. But it is probable that there are also vasomotor phenomena, and furthermore that the microbes inhabiting constantly the cavities of the face (streptococci, staphylococci, pneumococci, etc.) may have a part in the production of the inflammation. In some cases acute rhinitis seems to be certainly contagious.

Symptoms.

Sometimes the rhinitis is preceded by fever, headache, and sore throat. In many cases the affection begins in the pharynx and passes thence through the posterior nares into the nose; we have then dysphagia, a sensation of heat and dryness in the throat, sneezing, a distressing tickling in the nose, stuffiness, a more or less abundant

discharge from the nose of mucus which may irritate and excoriate the upper lip, watering of the eyes, congestion of the conjunctivæ, and swelling of the lids. There may also be epistaxis. During the daytime the child breathes quite comfortably, but at night the nostrils become obstructed, the mucus accumulates and dries, respiration is interfered with, and sleep is often disturbed. Sometimes the larynx takes part in the inflammatory process and we find the symptoms of a stridulous laryngitis. Fever is moderate or absent, and the appetite may be preserved although taste and smell are blunted. At the end of four or five days or a week at the most recovery ensues. In nursing children it is not uncommon to see the rhinitis become purulent and persist for several weeks. Such a change to a subacute or chronic state will lead us to think of syphilis. Coryza may also be complicated with otitis media by extension of the inflammation through the Eustachian tube, or with conjunctivitis by extension through the lacrymal ducts.

Acute coryza may be a grave affection in the new-born as it may prevent the child from taking the breast.

Diagnosis.

It is easy enough to recognize a rhinitis and to determine whether it is acute cr chronic, but in the new-born it is not always so easy to determine whether the process is simple and primary or whether it is secondary to hereditary syphilis. We should in all such cases search for the stigmata of this disease, and our treatment will depend greatly upon the results of this search. In later childhood the sudden invasion of a coryza may lead us to suspect a beginning of measles, influenza, or even diphtheria. It may be necessary to examine the nasal mucus bacterioscopically in order to determine the presence or absence of the Klebs-Loeffler bacillus.

Treatment.

The child should be confined to the room and should be warmly clad; a purgative should be given if there is a coated tongue; and in simple cases a few days will suffice to put an end to the trouble. If respiration is difficult a spray of boiled water or boric-acid solution should be applied every three or four hours. Inhalations of tincture of iodine or spirit of camphor, snuffing up a little boric-acid, or applications of a ten-per-cent. solution of cocaine may be of service. When the nasal secretion is very profuse, from five to ten drops of tincture of belladonna and of aconite may be given three times a day. Morning and evening we may place one drop of mentholated oil (1:30 or 1:40) in each nostril.

Chronic Coryza.

There are several varieties of chronic coryza. Cæna results more especially from a nasal malformation, and its treatment belongs to specialists. We shall here consider more particularly the coryzas due to syphilis or scrofula or consecutive to certain acute diseases.

Etiology.

Syphilis is a frequent cause of coryza in infants; after that come scrofula, nasal malformations, polypi, eczema, etc. Chronic coryza may follow repeated attacks of the acute affection, and may then be accompanied by nasopharyngeal catarrh. It is quite commonly observed as a sequence of measles or of whooping-cough.

Symptoms.

Syphilitic coryza of the new-born effects both nostrils. It is indicated by a sanious discharge which irritates the upper lip; the child's face is of an earthy color, and mucous patches may often be seen in the genitoanal region.

Scrofulous coryza is met with in children of a lymphatic appearance, of pale complexion, soft flesh, and blear eyes; the little patients often have moist eczema of the face, head, ears, and nostrils. The eczema invades the nasal mucous membrane and causes swelling with discharge, crust formation, etc. The irritation from the discharge may lead to an excessive hypertrophy of the upper lip. When ozæna is present the odor may be extremely fetid.

All forms of chronic coryza impede respiration, disturb sleep, and induce dryness of the throat, predisposing to inflammation of the pharynx, larynx, and bronchial tubes.

Sometimes the coryza is anterior and the discharge takes place from the anterior nares; but at other times it may be posterior, a more or less thick discharge being seen on the pharyngeal wall.

The course of the chronic affection is often interrupted by acute attacks, which aggravate the original malady and favor extension of the inflammation to the conjunctiva and to the middle ear.

A rhinoscopic examination will enable us to discover the ulcerations, swellings, thickenings, polypi, deviations of the septum, or other anomalies upon which the affection may depend or which it has caused.

Treatment.

If syphilis is the cause of the trouble, treatment by means of sublimate baths, mercurial inunctions, or Gibert's syrup (containing iodide of potassium and biniodide of mercury) will be found very efficacious. When the affection is independent of syphilis we must give generous tonics, cod-liver oil, iodide of potassium, iodotannic syrup, etc., while not neglecting local treatment by means of a spray of boric-acid solution, or irrigations with sublimate solution (1:5,000) or with some natural sulphur water. The eczema may be treated with applications of vaseline containing boric acid or salol. In some cases little pledgets of cotton dipped in cod-liver oil and introduced into the nostrils render wonderful service. I have successfully treated in this way a number of cases of scrofulous coryza.

Epistaxis.

Etiology.

Nosebleed may be symptomatic of an acute disease, such as measles, typhoid fever, whooping-cough, diphtheria, purpura, etc. It occurs frequently in leukæmia. It may be caused by an injury or be symptomatic of coryza, nasal polypi, the lodgment of a foreign body, or other local affection. Epistaxis may also occur spontaneously without any apparent cause in growing children. Some of these children may be "bleeders," others may be of arthritic or lymphatic stock. These spontaneous forms of epistaxis occur with special frequency in summer.

Symptoms.

The bleeding may occur suddenly or be preceded by headache and hot flushes. The blood flows from one nostril drop by drop or may be in a continuous jet. If the child is lying on his back, the blood may flow into the pharynx, be swallowed, and then be regurgitated, simulating a hæmatemesis or an hæmoptysis. Ordinarily the epistaxis is of short duration and the loss of blood is slight; but sometimes the attacks recur at short intervals and the amount of blood lost is very considerable, even so much as to expose the child to danger of death, or as to leave behind it profound anæmia.

Diagnosis.

When an epistaxis occurs in the midst of apparent health the problem before us is to discover the cause. If we can learn of no injury or great physical exertion, and can discover no local cause, we must

interrogate the general condition and inquire into the antecedents of the child. We must assure ourselves in the first place that the blood really comes from the nasal fossæ, and must not confound an epistaxis with hæmatemesis or hæmoptysis, or the reverse. An examination of the nasal mucous membrane in a good light will often enable us to discover the source of the hemorrhage. If the child has fever the epistaxis may be an initial symptom of some infectious disease, and we must look for other signs of measles, typhoid fever, or the like.

Treatment.

When the blood is flowing profusely the child should be made to rest quietly and avoid all movement. Irrigations with very cold or very hot water, the insertion of a tampon of cotton dipped in perchloride of iron, applications of a ten-per-cent. solution of cocaine, or a snuff of antipyrin will often suffice to arrest the bleeding. The surest measure is a complete plugging of the nares. Rhinologists advise that the source of the hemorrhage be looked for in a good light, and that the erosion of the mucous membrane, when found, be cauterized with a point of nitrate of silver, or with crystallized chromic acid which has been fused on the end of a probe.

To prevent a return of the hemorrhage we may prescribe the fluid extract of witch-hazel, ergotin, digitalis, or, especially in malarious regions, quinine. We should also employ cod-liver oil, iron, and cold douching, or sea baths in the season.

RESPIRATORY ORGANS.

Among the affections of the larynx which interest the general practitioner, in addition to croup and diphtheria, are acute and chronic laryngitis, spasm of the glottis, and the presence of foreign bodies.

Simple Acute Laryngitis.

Etiology.

Acute inflammation of the larynx, which is common in childhood, results most commonly from a cold attacking the larynx primarily or reaching it by extension from the nose or pharynx. We frequently see laryngitis preceded by rhinitis or tonsillitis. Sometimes the laryngitis results from the inhalation of very hot air or boiling liquids.

Apart from the physical agents (heat and cold) which produce primary laryngitis, we may see an acute secondary inflammation in influenza, typhoid fever, smallpox, whooping-cough, or measles. In the last-named affection laryngitis plays an important part; it may

be erythematous, superficial, and temporary, or may be complicated with ulceration, abscess, or suppurative perichondritis. When occurring early in the course of measles the laryngitis is usually mild and disappears with the eruption, of which it is only a mucous localization; but when it appears later it is more grave in character, and may become chronic.

Symptoms.

Hoarseness, a hollow cough, aphonia, and a pricking sensation in the throat constitute the chief symptoms of laryngitis. The hoarseness varies in intensity and duration, it being sometimes barely noticeable, at other times reaching even to absolute aphonia and persisting for several days or weeks. The cough is dry and troublesome, but there is no dyspnœa and auscultation of the chest gives negative results. An inspection of the throat will show a little redness and some mucus, but that is all.

After a few days the symptoms grow milder, the voice clears up, and the child recovers. In some cases, however, slight spasm is added to the catarrh of the larynx, the child has whistling inspiration and dyspnœa—the mere phantom of croup. In more severe cases a simple acute laryngitis may closely simulate croup and excite great alarm.

Diagnosis.

A differential diagnosis from diphtheria may be made by a bacteriological examination. Depression of the tongue and inspection or palpation will enable us to determine that there is no œdema of the glottis.

Treatment.

An emetic of ipecac (four to fifteen grains according to the age) or of tartar emetic (gr. $\frac{1}{2}$ to $\frac{3}{4}$) with or without a purgative (sulphate of sodium, jalap, etc.), may be ordered. Relief will often be obtained by a mustard foot-bath. I cannot praise too highly the use of a spray of boiled water or boric-acid solution; this moistens and cleanses the parts, moderates the inflammation, and arrests the spasm. The latter, when marked, may be combated by bromide of potassium, aconite, or belladonna.

Stridulous Laryngitis, or False Croup.

Stridulous laryngitis, Millar's asthma (Millar of London, 1769), spasmodic laryngitis (Rilliet and Barthez), stridulous angina (Bretonneau), is simply a laryngitis complicated with spasmodic stenosis.

Etiology.

The disease, which is common between the ages of two and five years, is often a familial affection and is met with in nervous children who are subject to convulsions. It is seen also in those who have enlarged tonsils or adenoid vegetations, obliging them to breathe through the mouth. A cold, a coryza, influenza, or measles may determine an attack of stridulous laryngitis. This attack occurs usually in the night, because then the child sleeps with open mouth, and the already irritated mucous membrane becomes so swollen as seriously to obstruct the opening of the larynx. During the day an attack may also supervene on an unusual exertion or when the child is vexed.

Symptoms.

The onset of the disease is sometimes sudden and entirely unforeseen, but usually the baby will be found to have had a slight cold for a day or two which had not, however, given rise to any solicitude on the part of the parents. He is awakened in the middle of the night by a hoarse croupy cough, with signs of impending suffocation. After a few moments of struggle he becomes quiet and falls asleep again, but the barking cough may persist for several days. The attack may be repeated the same night or the following night, but commonly there is no subsequent attack. Relapses, however, after longer or shorter intervals, are to be feared until the child has reached a certain age. They then disappear, for stridulous laryngitis is a disease of childhood and is unknown in adolescents and adults. It is usually stated that in the intervals of the attacks the health is perfect; this is true in the majority of cases, but there are exceptions and we sometimes see a difficulty in breathing persist for several days, constituting a sort of chronic form of stridulous laryngitis.

The disease may be complicated with bronchitis, bronchial pneumonia, pulmonary and subcutaneous emphysema, and sometimes even by pneumothorax. Ordinarily, however, the affection is benign in character.

Diagnosis.

This is not always easy and we ought in all cases to examine the secretions, especially in the prolonged forms, in order to exclude true croup. This affection does not begin suddenly, but is preceded by some local or general trouble to which attention has been directed. Retropharyngeal abscess situated low down may be recognized by direct examination. Signs of a foreign body in the air passages

appear suddenly in a suffocative attack, but it will usually not be difficult to diagnose the true condition. Spasm of the glottis is a tonic contraction of the laryngeal muscles, an internal convulsion which occurs without noise and lasts but a minute.

Treatment.

The first indication is to give an emetic of ipecac or tartar emetic. The legs should be wrapped in cotton wool. Sprays may be applied to the throat and we may prescribe antispasmodics, such as bromide of potassium. If the spasm recurs or is prolonged, or if suffocation is imminent, we may intubate or perform tracheotomy. A blister should never be applied to the neck, but at the most a hot sponge.

Spasm of the Glottis.

Spasm of the glottis, laryngospasmus, thymic asthma, is a nervous manifestation, occurring in infancy, either primary or secondary to whooping-cough, the presence of a foreign body, or tracheobronchial adenopathy. The description which follows is that of essential spasm of infants, Kopp's asthma, thymic asthma, so called because Kopp (1830) attributed it to compression of the trachea by the thymus gland. It is simply a tonic convulsion of the constrictor muscles of the glottis which may lead to asphyxia. Hérard,[35] Blache, Valleix, Barthez and Rilliet, and Trousseau have well studied this affection. According to them it is not due to hypertrophy of the thymus but is a partial internal convulsion.

Etiology.

Stridulous laryngitis affects older infants, but spasm of the glottis is a disease of young infants, the new-born and nurslings, especially those who are artificially fed. Most of the cases are seen in the first year of life, a few are encountered in the second, but none in the third. Boys are said to be more subject to it than girls, but this is doubtful. A certain fact in the etiology is the hereditary predisposition of children of nervous stock, born of hysterical, epileptic, or alcoholic parents. Chaumier believed that spasm of the glottis was a manifestation of infantile hysteria.

Of all the predisposing diseases rickets is the most active. Henoch found forty-five rachitic children out of sixty-one cases. I do not question the relationship, but am unable to explain it. Elsässer, believing that the spasm was caused by pressure of the brain

by the weight of the head on the pillow, regarded it as a symptom of craniotabes. Kassowitz does not regard compression as a factor but assumes a hyperæmia of the brain, which has not been demonstrated. It is certain that cranial rachitis, craniotabes, is found with some frequency in children suffering from glottic spasm, but this spasm is also seen in children who have not craniotabes, and is not always seen in those who have. There is therefore no relation of cause and effect between these two conditions. If rachitic children are frequently subjects of spasm of the glottis, it is because they are often poorly nourished, because they are dyspeptic and elaborate in their digestive tube poisons which irritate the nervous centres, the bulb. Dentition plays no rôle in the etiology. Cold is an exciting cause of an attack, just as are crying, emotions, or depression of the tongue. Sometimes spasm of the glottis is followed by general convulsions, being then only a partial form of infantile eclampsia.

We have as yet learned nothing of the nature of the disease from pathological anatomy, and glottic spasm must be regarded provisionally as a neurosis. Hypertrophy of the thymus may well cause asphyxia by compression of the trachea, but this is not glottic spasm.

Symptoms.

The infant, who is apparently in fair health, though poorly nourished, is suddenly seized with suffocation. There is an inspiratory whistle, the body stiffens, and the face is first pale, then cyanotic. Respiration is arrested and the eyes are fixed. At the end of a few seconds the thorax moves, a noisy expiration occurs, the apnœa ceases, and the crisis is terminated. At this stage, however, we may see general convulsions or tetany.

The attack is more or less disquieting according to its severity. In grave cases the face is cyanotic and covered with sweat and the extremities are cold; in mild cases there is simply an inspiratory whistle, accompanied by momentary dyspnœa. Death may occur even in the first attack, and is not infrequent when the attacks are severe and frequently repeated. In mild cases or those of medium intensity recovery is the rule.

Diagnosis.

The brief and silent spasm of this affection distinguishes it from stridulous laryngitis, which is noisy, occurs in the night, and is not accompanied by loss of consciousness. The spasm of whooping-cough is accompanied by the characteristic cough. The whistling

of croup is accompanied by a hoarse cough and aphonia. Œdema of the glottis is betrayed by noisy inspiration and dyspnœa resembling croup. Tracheobronchial adenopathy resembles pertussis more than it does glottic spasm. Asthma is manifested by dyspnœa with bronchial catarrh lasting an entire day or longer.

Treatment.

During the attack we must remove all constriction of the clothing, sprinkle the child's face with cold water, and rub his body with warm cloths or a stimulating liniment. If danger of death is imminent intubation may be practised. Kürt advises touching of the nasal or ocular mucous membrane with a feather dipped in a solution of quinine.

As a prophylactic measure we should correct the hygiene of the child, giving him a wet-nurse, or feeding him on good sterilized milk, and seeing that he is taken out regularly into the open air. We may also prescribe baths of decoction of tilia flowers, and the bromide of potassium internally. We should also see to it that the intestinal functions are properly performed.

Œdema of the Glottis.

Œdematous infiltration of the arytenoepiglottic folds is not a common affection in children.

Etiology.

The affection is usually secondary, having been preceded by an acute laryngitis, pharyngitis, erysipelas of the throat, retropharyngeal abscess, or perichondritis; or it may occur as a complication in laryngeal phthisis, in smallpox, scarlatina, diphtheria, or sclerema of the new-born. It has been observed as a result of sudden cooling or of burning through the ingestion of a hot liquid, such as boiling tea.

Symptoms.

The child has extreme difficulty in breathing, especially during inspiration, which is accompanied by whistling, anxiety, and cyanosis, with sweating of the face; expiration is comparatively free and aphonia is not complete, for the vocal cords are healthy. On introduction of the finger we may feel the mucous folds of the larynx thickened and soft, and the opening of the organ is found to be there-

by closed. The uvula and the pillars of the palate may be simultaneouly affected.

The disease is one of extreme gravity.

Treatment.

If there is generalized œdema, anasarca, we should give a purgative, diuretics, and mustard foot-baths. We may endeavor to reduce the œdema of the larynx by the insufflation of an astringent powder (tannin or alum) or by a spray of an astringent solution, such as extract of rhatany, 1 part to 50 of water. If the asphyxia persists we must perform tracheotomy, for intubation is impossible, and would be dangerous, because of the false passages which might be made.

Chronic Laryngitis.

The chronic forms of laryngitis are comparatively rare in childhood.

Etiology.

The acute laryngitis of measles may persist after the fever has subsided, and may then pass into a chronic condition. Some lymphatic children have permanent disturbances of phonation, consequent upon tonsillar hypertrophy or pharyngeal granulations, with mucopurulent catarrh. Hereditary syphilis sometimes causes a chronic laryngitis. But the most frequent cause of chronic disease of the larynx is tuberculosis, which here, as elsewhere, may be localized under the form of granulations or of ulcers, with more or less acute inflammatory reaction, and which may extend to the cartilages, resulting in perichondritis or in œdema of the larynx.

Symptoms.

In every case of chronic larnygitis we find cough, continuous or intermittent dyspnœa, and especially disturbances of phonation, such as hoarseness, dysphonia, or even aphonia. Children complain of local pain and of a tickling sensation in the throat. The cough is troublesome, short, and accompanied by expectoration, in children who are old enough to expectorate. Dyspnœa is ordinarily not very marked, but whenever any œdema of the larynx occurs, it becomes excessive.

The *prognosis* of laryngitis depends upon the cause and the œdematous or suppurative complications which may supervene. When simple it is readily curable.

Diagnosis.

Chronic laryngitis may be recognized by its slow evolution. Its nature will be indicated by the symptoms present in the individual case, as well as by the previous history. A laryngoscopic examination is necessary in order to determine the nature and extent of the lesions—whether these consist in simple swelling and redness or whether there are ulcers, polypi, papillomata, etc.

Treatment.

If syphilis is the cause of the affection we must prescribe mercury and iodide of potassium, by means of which a cure will easily be effected. In tuberculous laryngitis the treatment is more difficult; we should give tonics, cod-liver oil, sprays of creosote, or local applications of lactic acid. If suffocation becomes imminent tracheotomy will be indicated.

Foreign Bodies.

Foreign bodies in the larynx are not excessively rare in childhood.

Etiology.

A purulent collection in the neighborhood may burst into the air-passages, or blood, curdled milk, or intestinal worms coming from the stomach may enter the larynx. These foreign bodies, however, do not especially interest us, but we have to consider solid substances accidentally aspirated by the child. Children have the habit of putting all sorts of things into the mouth, and these, when of small size, may, by a sudden inspiratory movement, be taken into the larynx. Sometimes the passage of a foreign body is due to paralysis, as that following diphtheria, for example. In one hundred and thirty cases Bertholle[36] found the foreign body to be a bean in thirty-three cases and a plum or cherry-stone in nineteen.

Pathological Anatomy.

The foreign body may be arrested in the larynx or enter the trachea or bronchial tube. In 156 cases of foreign bodies Bourdillat[37] found 35 in the larynx, 80 in the trachea, 26 in the right bronchus, and 15 in the left bronchus. When the body is rather large or angular, it is often arrested in the subglottic space or in the ventricles of the larynx. A case has been reported in which a piece of the shell of a nut was arrested in one of the ventricles, causing symptoms of croup, and was

finally passed out through a tracheotomy tube. The trachea is only a passageway, being usually too large to fix a foreign body, which simply floats in it, following the respiratory movements. But the foreign body, which is at first movable, may swell and become immobilized. Upon contact with the foreign body the mucous membrane becomes inflamed and ulcerates and the bronchial tube may be perforated, leading to bronchopneumonia, gangrene, purulent pleurisy, or especially bronchial dilatation. Bouvier[38] has reported the case of a boy eight years old who died after having swallowed the ferrule of an umbrella. At the autopsy the left bronchus was found plugged and ulcerated, there was pus in the pleura, and abscesses were found in the lung. Pulmonary or subcutaneous emphysema may follow an attack of suffocation. When the foreign body has remained a long time in the bronchial tube it may cause a general or bronchial dilatation, or one limited to that side. This lesion is more common than would be supposed.

Symptoms.

The first symptom is an attack of coughing and suffocation; a period of calm follows, but there may be several recurrences of the dyspnœa. This interval of calm is deceptive. The intermittence of the symptoms is explained by the movements of the foreign body, for when it is fixed the paroxysms cease. The children sometimes complain of pain in the larynx or beneath the sternum, and various sounds may be heard on auscultation when the body is movable in the trachea. As soon as the body becomes fixed in the bronchus it determines apnœa in the dependent territory; the percussion note is normal, but the vesicular murmur is absent or very faint. If râles are present they are an indication of an inflammatory complication, such as bronchitis or pulmonary congestion. A foreign body may cause but one attack of suffocation, followed by a long period of calm; then the child has a cough, with purulent or bloody expectoration, and presents other symptoms of purulent pleurisy, chronic bronchitis, or pulmonary phthisis.

In short, foreign bodies in the air passages menace immediately or remotely the life of the child, and even tracheotomy is not always successful in removing this danger.

Diagnosis.

The youth of the patients, their surprise, and their fright render it difficult to obtain an answer to our questions, and we are often obliged to make a diagnosis without any information as to the beginning of

the trouble. The intermittence of the attack, and the history, when we are able to obtain any, will enable us to exclude croup, laryngismus stridulus, and œdema of the larynx. Auscultation may give us a valve-like sound and limited absence of respiratory sounds with preservation of the normal pulmonary resonance. If the body can be seen in the laryngoscope, of course the diagnosis is made. It may sometimes be necessary to catheterize the œsophagus to exclude foreign bodies in the digestive tract, and an examination of the secretions will enable us to eliminate diphtheria.

An error in diagnosis is, however, possible, and Sevestre has seen in the diphtheria pavilion a little girl who had inspiratory dyspnœa and attacks of suffocation, who was treated with injections of Roux's serum, notwithstanding the absence of the Klebs-Loeffler bacillus, without success; after tracheotomy a nutshell was dislodged from the larynx. De Pradel has reported the case of a little girl five years old, who had been supposed to be suffering from pertussis for four months, who recovered after the spontaneous expulsion of a small pebble.

Treatment.

The first indication is to provoke expulsion by the natural channels. Emetics are useless for this purpose. Holding the child with head downwards sometimes succeeds, and sometimes the foreign body may be dislodged by coughing or striking the back. If the body is arrested in the larynx it may be extracted by aid of the laryngoscope, but tracheotomy is the operation to be resorted to in most cases, and it has saved many lives.

Acute Tracheitis and Bronchitis.

Acute inflammation of the trachea and bronchial tubes, the ordinary "cold on the chest," is a most common disease at all ages, and although it is not in itself a very serious disease, it may lead to grave consequences. Through the trachea and bronchi there pass incessantly currents of air containing dust, and often irritating by reason of a too high or a too low temperature. Numerous microorganisms are constantly being inhaled in the air; they are usually arrested by the mucus, turned back by the vibratile cilia, and destroyed by the phagocytes. But when the mucous membrane is weakened by any cause these microbes become active and give rise to bronchial infections of various sorts.

Etiology.

When the cold is simple in character, when, following an acute corzya, we find a slight cough with a sense of heat in the throat or behind the sternum, without any râles on auscultation, we may assume that the affection is a simple tracheitis. The disease may stop here, but often, especially when the child is very young, the inflammation extends to the bronchial tubes of medium and large size, and then the bronchitis is established.

The disease is one of winter and is rare in summer, and its most frequent cause is cold. But in addition to the simple forms of primary bronchitis we see secondary forms due to influenza, measles, whooping-cough, or typhoid fever. Bronchitis may also follow an eczema or asthma. Dentition has been sometimes stated, but incorrectly, to be a cause.

Pathological Anatomy.

In addition to the lesions visible to the naked eye, such as swelling and redness of the mucous membrane with mucopurulent secretion, we see under the microscope epithelial desquamation, infiltration of leucocytes, and increased vascularization. Bacterioscopic examination reveals the presence of numerous microbes, such as streptococci, staphylococci, and sometimes pneumococci. In simple bronchitis the lesions may extend over a wide surface, but they are of little depth; they are present as an eruption on the mucous membrane, but they do not ulcerate or destroy it. The lymphatic glands in the neighborhood may become enlarged but they are only moderately inflamed, and need not be taken into account in most cases. In the lungs we may find a slight degree of emphysema in the upper and anterior portions and congestion at the base.

Symptoms.

The child first has a cold in the head with sneezing, then has a slight cough, and the whole may be terminated in a few days; this is simple laryngotracheitis, a common cold. At other times there may be fever, a frequent and troublesome cough, and more or less serious involvement of the general system, with loss of appetite. In this acute and intense form of bronchitis the respiration is difficult and accelerated, the pulse is frequent, and the temperature is elevated. The cough is at first dry, painful, and paroxysmal, and later becomes looser but without expectoration, the child swallowing the sputum.

Percussion gives no sign, but auscultation reveals numerous disseminated râles, some sibilant, others mucous. The sonorous râles are movable and are usually made to disappear by coughing, but the mucous râles are more fixed and permanent.

We may distinguish several degrees of bronchitis, according to the râles: sonorous râles indicate a moderate inflammation of the larger tubes; sibilant râles attest the participation of the bronchial tubes of medium and small calibre; mucous and crepitant râles mark a more advanced and more lasting stage. The râles, however, may be mixed, the lesions being then also mixed and diffused.

The fever is moderate, and though the thermometer may mark 39° C. (103° F.) it does not do so long; if the temperature reaches 40° C. (104° F.) we may suspect some complication, such as an area of bronchopneumonia.

The duration of the disease is variable, from four or five days to one or two weeks. We may see relapses, or remissions followed by exacerbations, which will considerably increase the duration of the malady. These relapsing forms mark the transition between acute and chronic bronchitis.

Prognosis.

The prognosis is usually favorable, for acute bronchitis almost always gets well when it is primary and attacks previously healthy children. The prognosis must be reserved, however, in the case of the new-born and of infants under one year of age in whom a complication with bronchopneumonia readily occurs. As above remarked, this complication is to be feared when the temperature remains elevated. Bronchitis secondary to the eruptive fevers is more grave than the primary form, as is also the primary disease when it occurs in marasmic or cachectic children. The disease is more apt to persist during the winter than in summer.

Diagnosis.

Acute bronchitis may be recognized by the functional symptoms (cough and dyspnœa) and by the physical signs (sonorous or mucous râles). Without the aid of auscultation we are unable to affirm that bronchitis is present, for many children cough with a simple coryza, sore throat, or laryngitis. When we find ourselves in the presence of a bronchitis the first question is as to whether it is simple or whether it conceals an influenza, whooping-cough, or measles which will declare itself later. We must also think of the possibility of pulmonary tuberculosis, and examine the apices. We must inquire into the mode

of invasion, the apparent cause, the occurrence of an epidemic at the time, etc.

Treatment.

We must not give opium for fear of paralyzing the lungs and lessening the reflex cough by means of which the bronchial tubes are unloaded. Emetics and purgatives, such as ipecac, calomel, and scammony, are indicated. Revulsion should be made by means of cups, mustard plasters, or tincture of iodine. The atmosphere of the room may be saturated with vapor, and sprays may be directed into the child's mouth. If there is much depression, we must give brandy or rum. The legs should be enveloped in cotton wool. The child should be isolated as a precautionary measure, for the boundaries of contagion are very uncertain.

Simple Chronic Bronchitis.

When the symptoms above enumerated persist for weeks or months, we say that the bronchitis is chronic. I have previously described the affection in 1884 and again in 1886.[39]

Etiology.

Chronic bronchitis in children may follow a neglected acute attack or it may arise gradually, being of a chronic character from the beginning. Generally, however, chronic bronchitis is secondary, occurring in the course of measles, pertussis, typhoid fever, or influenza, in which affections the bronchial tubes are almost always more or less involved. Sometimes chronic bronchitis is preceded by digestive troubles, dyspepsia, or rachitis, and it may follow asthmatiform attacks of a toxic order. It may also be seen in athrepsia and in hereditary syphilis. It is especially common in children of lymphatic, scrofulous, arthritic, or tuberculous heredity. The nature of the soil appears to play a very important rôle in the chronicity of bronchitis in childhood.

Symptoms.

In this form of bronchitis the children do not appear to be ill, and they would not be brought to the physician if it were not that the persistent cough alarms those about them. This cough is more marked in the evening and in the morning than during the day, and it interferes with sleep; it is accompanied by a mucopurulent expectoration in children who are old enough to expectorate. It is worse in cold and damp weather and gets better during the summer. The child is in good spirits and strength and has a good appetite, and the only

thing remarked is that he is a little pale and has lost flesh. He has no dyspnœa, no fever, and no pain. Percussion gives no definite signs; sometimes the pulmonary resonance is lightly increased as if there were some emphysema. Auscultation reveals the presence of more or less numerous râles, sonorous, sibilant, subcrepitant, sometimes generalized, sometimes limited to one side or to the base of one lung. There is no blowing murmur or fine crepitation.

Prognosis.

In simple chronic bronchitis pulmonary tuberculosis is absent and there is no emphysema at first, though this may appear if the original disease persists for a long period. The bronchitis is therefore simple, it is accompanied by no deep lesions, and it is curable.

Diagnosis.

Chronic bronchitis may be recognized by the persistence of the cough and of the râles, and its simple nature is shown by the absence of fever and by the preservation of the strength and appetite. Pulmonary tuberculosis is accompanied by different auscultatory signs which are moreover most marked at the apices; the general health is also gravely compromised. Tracheobronchial adenopathy is shown by spasmodic attacks, by dulness, and by a blowing sound over the point of bifurcation of the bronchi. The cough of pertussis is sufficiently characteristic to prevent error. Granular pharyngitis is not accompanied by any intrapulmonary changes manifested by auscultatory signs.

Treatment.

The treatment should be both general and local. We may give evacuants and the balsams during the exacerbations, and may apply tincture of iodine externally or cups to the chest. We should insist upon cod-liver oil, iodides, and sulphur preparations, and send the patient in the summer to spas of the nature of Eaux-Bonnes, Luchon, etc.

Pseudomembranous Bronchitis.

This affection is characterized by the presence of fibrinous casts which obliterate more or less completely the lumen of the bronchi.

Etiology.

The disease is very rare at any age, and is never seen in infants. Of forty-four cases collected by Lucas Championnière,[40] eight were in children from eight to fifteen years of age. I have seen a girl of

seven years affected with the disease, and Magniaux[41] has reported an interesting case in a boy eleven and one-half years old. It may coincide with asthma, emphysema, or pulmonary tuberculosis. In the case of Magniaux Friedländer's bacillus was found. Claisse[42] found streptococci in the membranes and injections of antistreptococcus serum are said to have brought about an improvement. Pseudomembranous bronchitis appears therefore not to be caused always by the same microorganism, and among those which are capable of producing it are to be mentioned streptococci, Friedländer's bacilli, pneumococci, Klebs-Loeffler bacilli, tubercle bacilli, etc.

Pathological Anatomy.

The bronchi of medium and small size are obliterated by whitish, fibrinous cylinders, which follow the arborizations, and which may be expectorated unbroken, as I have seen in one of my own cases. We have then under our eyes a very beautiful polypiform mass, the trunk of which is as thick as a penholder, and which divides into smaller and smaller branches terminating in an actual tuft of hair-like branches. The cylinders are solid, and according to Grancher the stroma is not composed of fibrin, as in diphtheria, but of mucin containing numerous leucocytes.

Symptoms.

It is usually said that pseudomembranous bronchitis is a chronic malady, but it is not always so, and in the case of Magniaux as well as in mine the course was acute. The little girl whom I saw had an intense dyspnœa, cough, cyanosis, and finally she expectorated the cast of the tubes when relief followed. Examination of the chest revealed dulness and a blowing sound on the left side posteriorly over a wide extent of surface. In chronic cases there is an absence of respiratory sounds over a portion of the pulmonary area with sometimes a flapping sound (*bruit de drapeau*), and hæmoptysis.

The affection is a serious one, although a cure is possible.

Diagnosis.

The diagnosis is impossible unless the child expectorates the characteristic white cylinders; if any of these are expectorated they should be examined in water when we can see the beautiful ramifications. In order to exclude diphtheria, a bacteriological examination will be necessary.

Treatment.

Emetics and purgatives are indicated, such as ipecac, kermes mineral, copaiba, cubebs, and the balsams. The throat should be sprayed freely with boric-acid solution, and cups and sinapisms may be applied to the thorax. Alcoholic stimulants may be necessary. A sojourn in the South during the winter is to be advised, and a visit to some sulphur-water spa in the summer.

Dilatation of the Bronchi.

Bronchial dilatation was described for the first time by Laennec, and after him by Andral, Louis, Barthez and Rilliet, and others.

Etiology.

That dilatation of the bronchi may be produced it is necessary that they should have been irritated for a long period. Repeated attacks of bronchitis, whooping-cough, or bronchopneumonia following measles, influenza, diphtheria, or even smallpox, and foreign bodies in the air passages may cause bronchiectasia. The dilatation is a sequel and not a primary affection.

It may occur at any age. Laennec observed bronchiectasia in the left lower lobe consequent upon whooping-cough in a child, and Lacour[43] reports cases in children of one and one-half, two and one-half, three, three and one-half, five, and nine years.

Pathological Anatomy.

There is not only dilatation of the bronchi in a more or less extensive portion of the lung, but there is also a lesion of the pulmonary tissue, consisting in peribronchial sclerosis. Barthez and Rilliet saw a dilated bronchus at the surface of the lung corresponding to a point of pleural adhesion; this bronchus was continuous with other dilated branches in the parenchyma of the lung, the walls of which were thickened, and the cartilages destroyed by connective-tissue hyperplasia and embryonal infiltration. On section we see areolar cavities between which the pulmonary tissue seems to have disappeared. In a girl of eight years who had had pertussis at five years and measles at six, Luzet[44] found on section of the left lung numerous little cells formed by the dilated bronchi (cylindrical dilatation), between which the tissue was dry, hard, reddish, and non-crepitant. At the apex were found four or five polyhedral cavities. The bronchial walls were disorganized and replaced by fibrous tissue infiltrated with round cells. In a girl of three and a half years, who had had whoop-

ing-cough seven months before, Lacour found ampullar dilatation of the bronchi on the right side, which formed little projections under the pleura, without pulmonary sclerosis. These lesions were most marked in the middle and upper lobes. Sometimes the dilatation is large enough to simulate a tuberculous cavity. The wall is smooth, or may be ulcerated through superficial gangrene following upon putrefaction of the exudate. We sometimes find pulmonary emphysema. In a girl of eight years Gintrac found the bronchial cartilages hypertrophied, the walls of the trachea being 7 mm. in thickness and its lumen being reduced to 5 mm. Around the dilated bronchi the pulmonary tissue was hard and creaked under the scalpel. According to Charcot and Trojanowski there is first an embryonal infiltration, destroying the muscular coat of the bronchi, and later dilatation through absorption of the fibrous tissue.

Symptoms.

The origin of the affection is lost in the symptomatology of the attacks of bronchitis or of bronchopneumonia which have preceded the ectasia. The children instead of recovering perfectly continue to cough, then begin to lose flesh, have night sweats and hectic fever, and it begins to be feared that they are tuberculous. The appetite is lost, the children grow weak, sometimes there is purulent expectoration or hæmoptysis, and the fingers become clubbed. On auscultation we hear, more frequently on one side rather than on both, in the middle or lower portion more often than at the apex, abundant moist râles, and a gurgling or sometimes even a cavernous sound which may lead one to suspect the presence of one or more tuberculous cavities. Percussion usually gives negative results, and at most there is but a slight degree of dulness. When the children cough, and this they do especially in the morning, they expectorate a purulent mucus, which is sometimes fetid, varying in amount according to circumstances. The symptoms of the affection are essentially remittent, and for weeks the children may do fairly well, regaining their appetite and improving in flesh, and then they begin to cough and to suffer from suffocative attacks. I once had under observation a girl of ten years who presented these alternations during a period of several years. Five years previously she had drawn in a cherry-stone which had remained in the bronchi for five months and had then been expelled in a fit of coughing. This child had a bronchial dilatation on the left side. After having become greatly emaciated she began to get better, the appetite returned, and to see her no one would have suspected the presence of the lesion manifested by the auscultatory sounds. Examination of the sputum showed the absence of tubercle bacilli.

Dilatation of the bronchi takes place very gradually during a period of years, but notwithstanding its slow progress, the prognosis is grave, for the life of the child is at the mercy of some pleural or pulmonary complication, such as empyema, gangrene, septicæmia, etc.

Diagnosis.

There are no pathognomonic symptoms of bronchial dilatation and hence the diagnosis is very difficult. We must eliminate chronic simple bronchitis in which there are no gurgling sounds and which does not affect the general health; pseudomembranous bronchitis, which is shown by the expectoration of fibrinous casts; pulmonary phthisis, which is characterized by the presence of tubercle bacilli, not to mention its other characteristic symptoms; and pulmonary gangrene, which has a much more rapid course and much more alarming symptoms, but which may nevertheless complicate bronchial dilatation. The error which is most liable to be committed is that of mistaking a bronchial dilatation for ulcerating tuberculosis.

Treatment.

We must place the children under the best hygienic conditions as regards nourishment and climate, send them during the season to some sulphur spa, give them cod-liver oil and tonics, and have them inhale some of the balsamic preparations. I have used with benefit sprays of eucalyptus and creosote and have seen much good following the administration of pills containing ergotin, quinine, creosote (5 cgm. each), and strychnine (1 mgm.). The children take from two to five of these pills a day. A perfect cure is, however, very problematical.

Tracheobronchial Adenopathy.

This is a very common or a very rare affection according as we regard it from an anatomical or a clinical point of view. At the post-mortem examination of young children we often find hypertrophied and caseous bronchial glands, but it is very rare for these enlarged glands to give rise to symptoms during life.

Etiology.

We have to distinguish simple adenopathy due to an infection with pus bacilli or pneumococci, which finds expression in a temporary swelling of the glands and in bronchopulmonary inflammations, and a tuberculous adenopathy which is the most usual kind. It

is undoubted that tuberculosis at all ages is most frequently contracted by the inhalation of dust containing the tubercle bacilli, and infiltration of the bronchial glands marks the first stage of this infection. Sometimes the tuberculous adenopathy accompanies or precedes pulmonary phthisis, of which it appears to form a part; sometimes it exists alone for a long period, always menacing the child with the possibility of a generalization of the process or of its dissemination to distant parts through the blood current. We have often confirmed the statement of Rilliet and Barthez that tuberculous bronchial adenopathy may exist without traces of a pulmonary lesion, and we do not agree with the statement of Parrot that there is always a primary pulmonary lesion. The tubercle bacillus may be inhaled and pass through the mucous membrane into the lymphatics without lesion of this membrane and without leaving any traces of its passage, and this is the most common mode of infection. Among those who have studied most profoundly the subject of tracheobronchial adenopathy should be mentioned Guéneau de Mussy and his pupil Baréty.[45]

Pathological Anatomy.

There are three principal groups of hypertrophied glands: (1) Peritracheal glands in relation with the superior vena cava, the pneumogastric and the recurrent nerves; (2) peribronchial glands in relation with the pulmonary plexuses, the œsophagus, and the aorta; (3) glands of the hilum surrounding the ramifications of the bronchi and of the pulmonary artery at their entrance into the lung. These glands may be affected singly, successively, or simultaneously, forming rows of beads, or masses as large as filberts or walnuts; some are found in the anterior mediastinum under the sternum, others rest in the costovertebral grooves. Red, purplish, or blackish on the surface, on section they are seen to be yellow, caseous, purulent, cretaceous, or hollow. The cavities in the glands may communicate with a bronchus or a vessel. All forms and all degrees of tuberculous infection may be met with. The neighboring organs, bronchi, vessels, or nerves, may be pressed upon, narrowed, displaced, or ulcerated by these glands. After breaking down, the glands may discharge into the pleura, the pericardium, the œsophagus, or the lung.

Symptoms.

All these complications are fortunately rare, for most bronchial adenopathies are latent, giving no sign of their presence during life. During the past two years I have studied this affection in all the

children in my service at the Hôpital Trousseau, and have found tuberculosis and caseous glands in a large number of autopsies, although during life I found but one case which was manifested by any characteristic symptom. I may then say that the clinical picture of tracheobronchial adenopathy is very rarely seen. With this caution we may recount the symptoms as given by authors. These are dulness on percussion anteriorly over the upper portion of the sternum, and posteriorly in the interscapular space; this dulness, which is masked by the pulmonary tissue, is never absolute, and in order that the sign may be obtained the mass of hypertrophied glands must be very large and in immediate relation to the thoracic wall, and it requires a light and trained finger to detect it. Auscultation gives variable results; sometimes there is roughened respiration or even a blowing sound over a limited area on the right or left side, due to compression of a bronchus or of pulmonary tissue; sometimes the respiratory murmur is diminished or even abolished in consequence of the flattening and resulting obliteration of a bronchus. When these modifications of the vesicular murmur coincide with a slight dulness we may make the diagnosis, but this coincidence is rare.

Among the functional troubles we note attacks of dyspnœa, suddenly affecting a child who has previously suffered from whooping-cough, bronchitis, or measles; a noisy troublesome cough recalling that of pertussis, but without the whoop, accompanied by swelling, turgescence, and cyanosis of the face; hoarseness and perhaps aphonia. All these symptoms are due to a compression of the recurrent or pneumogastric nerve by the enlarged glands. Paroxysmal tachycardia and palpitations have also been noted. When we find dyspnœa and cyanosis of the face we may conclude that the trachea, or the larger bronchial tubes are compressed. Œdema of the face and of the neck points to compression of the superior vena cava. I need only mention hæmoptysis, pleurisy, pneumothorax, and pericarditis, which are all very rare. The malady progresses by spasmodic exacerbations, separated by irregular intervals.

The *prognosis* is very grave, although a cure through fibrous transformation and calcification of the glands is possible.

Diagnosis.

It is very difficult to recognize this affection and errors are frequent. The symptoms caused by these enlarged glands may simulate those of a tuberculous cavity or pulmonary consolidation. When we see a child who has attacks of dyspnœa, with cyanosis and a pertussis-like cough (whooping-cough being excluded), and when this child

has at the same time enlarged glands in the neck, in the axillæ, and in the groins, we may almost with certainty affirm that tracheobronchial adenopathy is present. We must always remember the possibility of asthma, of laryngismus stridulus, of glottic spasm, and of whooping-cough. Large masses of enlarged glands in the neck and axillæ may suggest leucocythæmia, and an examination of the blood may be necessary to remove all doubt.

Treatment.

When clear physical signs of adenopathy (dulness and a blowing sound) are present we should make local revulsion by means of small flying blisters, punctate cauterization, or painting with tincture of iodine. Frictions may also be made with a stimulating ointment composed of iodide of potassium and extract of conium, each 2 parts, in benzoated lard, 30 parts.

Internally we may give from gtt. v.–xv. daily of tincture of iodine in coffee or Malaga wine, iodized milk (gr. iss. of iodine to the quart of milk), iodide of potassium, tincture of conium (gtt. i.–x.) cod-liver oil, syrup of the iodide of iron, or iodotannic syrup. The waters of Bourboule or of Mont-Dore may be employed, or those of Challes or of Eaux-Bonnes when bronchial catarrh is present. The children should pass the winter, if possible, in a mild climate. Guéneau de Mussy speaks very highly of baths containing in solution iodide, carbonate, and chloride of sodium, in the proportion of 20, 125, and 1,000 parts respectively.

Pulmonary Tuberculosis.

While this is a disease which may occur at any age, it has during childhood certain peculiarities which are worthy of mention.

Etiology.

Children, whether or not predisposed to disease by heredity, may become tuberculous by contagion. The ingestion of tuberculous substances, of Koch's bacilli in the milk or food, rarely gives rise to pulmonary phthisis; but, on the other hand, the inhalation of dust laden with the microorganism very frequently causes a tracheobronchial adenopathy which becomes a virulent focus, a starting-point from which microbial infection may arise and cause a pulmonary tuberculosis, a meningitis, a miliary tuberculosis, or an osseous

tuberculosis. In the great majority of cases, therefore, a tracheobronchial adenopathy forms the first stage of tuberculous infection. Pulmonary tuberculosis is of more rare occurrence in the country than in the city, children in the country being less exposed to the contagion. Large towns are poisoned by thousands of phthisical persons, who by their promiscuous expectoration sow the seeds of the disease in every direction. As far as possible children should be kept from all intercourse with tuberculous adults. Very young children, such as the newly born and nursing infants who are carried in the arms, are less often affected with pulmonary tuberculosis than older children, because they are less exposed to the inhalation of bacillus-laden dust. Yet they sometimes become a prey to the disease, so that one is inclined to wonder whether the affection in certain cases may not be congenital. While not prepared to deny that there may be direct hereditary transmission, we must recognize that by far the most common origin is through infection.

Certain diseases favor the development of pulmonary tuberculosis in children: pertussis, measles, and repeated attacks of bronchitis have a markedly bad influence, and so to an equal extent have defective alimentation and hygiene, and poverty.

Pathological Anatomy.

I have already stated, and I repeat the fact, that when the lungs are affected the tracheobronchial glands are always found to have been invaded by tuberculosis, the advanced state of their lesions almost forcing the conclusion that they were the first seat of the disease. Careful research should therefore always be directed to this point. In children it frequently happens that the process in the lungs is scarcely apparent, there being only small foci or a few scattered granulations, so that were it not for the results of bacteriological examination and of the inoculation of guinea-pigs one would be tempted to question the diagnosis. In other cases the lesions are both marked and extensive. Disseminated in both lungs, with predominance in one lobe or in the lobes of one side, we find innumerable granulations of small size and of a grayish color, or larger and of a yellow color, which infiltrate the parenchyma, are scattered upon the surface, etc. Or there may be grayish indurated masses, branching and outlining the bronchioles and the alveoli (tuberculous bronchopneumonia), or voluminous caseous masses, or caverns which are empty or filled with a yellowish substance. These caverns are found in greatest numbers at the apex. I shall not go into the details of such lesions as likewise exist with similar characteristics in the

adult. The especial characteristic of the disease in childhood is its tendency to extend, to become diffuse and generalized. Coexistent with the pulmonary lesions we find granulations in the spleen, which is often fatty and hypertrophied, in the liver, kidney, meninges, peritoneum, etc.

Symptoms.

In children beyond a certain age, pulmonary tuberculosis exhibits no special characteristics. This is, however, not the case in nursing infants. Here it is often latent, the child does not cough at all, but gradually loses its vitality without apparent reason; it may not be feverish, it may have a good or even an exaggerated appetite, and may yet succumb to progressive cachexia, diffuse pulmonary tuberculosis being found at the autopsy. In other cases the child may be in a continuously feverish condition, suggestive of typhoid, dying in a few weeks in coma or convulsions. At the autopsy a disseminated, miliary tuberculosis is found. Again, the child may be convalescent from measles or pertussis but continues to cough and presents symptoms of bronchopneumonia, dying at the end of a few weeks or months; here, again, an advanced state of pulmonary tuberculosis is found.

Auscultation reveals no special symptoms beyond moist, disseminated râles or occasionally a souffle, and a diagnosis is made of bronchitis or of bronchopneumonia. Young children do not expectorate, and are but rarely subject to hæmoptysis, yet it may happen that blood comes from the pulmonary vessels and reaches the throat, when it is usually swallowed, to be later vomited or passed off in the fæces. Hæmoptysis in this case would be masked by hæmatemesis or melæna; the pulmonary hemorrhage must be of great abundance to cause an immediate hæmoptysis. In young children pulmonary tuberculosis is rapid in its course, terminating in a few weeks, this being largely due to the fact that its regular course is interrupted by the involvement of other viscera, especially the cerebrospinal meninges. Prognosis is grave, a recovery being wellnigh impossible.

Diagnosis.

The younger the child the more difficult the diagnosis. There will be symptoms of bronchitis or of bronchopneumonia, without constant marked signs at the apices. The existence of small, hard ganglia in the neck (micropolyadenopathy) has not the semeiological value which has been attributed to it. As the infant does not expectorate the Koch bacilli can be sought for only in the fæces. There

are therefore no pathognomonic symptoms, and the physician will have to depend upon his instinct and his large experience with similar cases which enables him to recognize the condition at a glance. Before making our diagnosis we must exclude typhoid fever and influenza, which have a symptomatology very similar to that of some acute cases of tuberculosis; while, on the other hand, we must bear in mind that there may be granulations in the lungs when infants are in an ill-defined typhoid state, without eruption, etc. In cases which continue to be doubtful it might be well to resort to the injection of tuberculin. If it cause febrile reaction, we may conclude that there is tuberculosis present.

Treatment.

The tuberculosis of young children is scarcely amenable to treatment. The little patients are to be sustained as much as possible by means of nourishing food; several drops of creosote should be given to them in milk or in enemata; they should be placed in a comfortable room with the best ventilation. Older children should be treated like adults (climatic treatment, etc.).

Capillary Bronchitis and Bronchopneumonia.

Bronchopneumonia, of which capillary bronchitis is merely a variety, is characterized anatomically by a diffuse and extensive inflammation of the smaller bronchioles and the alveoli.

Etiology.

Bronchopneumonia is peculiarly a disease of infancy, and to pediatrists is due the credit of having recognized this fact: namely, to Gerhardt, Rufz (1834), Jorge (1835), Valleix (1838), Fauvel, Rilliet and Barthez (1840), Legendre and Bailly (1844), Gairdner (1850), Roger, Cadet de Gassicourt, and others. In young children, nurslings before or just after weaning, in fact from birth up to the age of two or three years, the disease is most common, becoming rare in later childhood and exceptional in adults. It is of very frequent occurrence in hospitals, attacking by preference children who are exhausted or weakened by previous disease (measles, whooping-cough, diphtheria, influenza, athrepsia, rachitis, diarrhœa, tuberculosis, etc.). It is usually secondary, but it may be primary in very young children, following a simple cold or a bronchitis. The microbes found vary and may be the streptococcus, pneumococcus, staphylococcus, the bacillus of Friedländer, or the bacterium coli

commune. Bronchopneumonia has no special characteristics; it is a secondary infection resulting from the excessive virulence of microbes inhabiting the nasal or buccopharyngeal cavities. In some cases it appears to be contagious, as in hospitals or other places where there is overcrowding and a lack of cleanliness.

Pathological Anatomy.

The lesions are multiple and may be found in any portion of the intrathoracic respiratory passages, occurring without apparent order, with a tendency to generalization and diffusion. There are both movable and fixed lesions, the former being congestive in their nature, congestion playing a great part in the bronchopneumonic process. The lobes invaded by the inflammation are hard, contain no air, are filled with blood, and in color are pink, red, or purple. Upon section there is an abundant flow of blackish blood, the bronchial and pulmonary vessels are swollen and filled with red corpuscles, and the alveoli are effaced. This congestion may go on to intrapulmonary hemorrhages, to apoplexy, ecchymoses, or to subpleural effusions. The lung is increased in size and weight. Sometimes it is diminished and devoid of air, like that of a fœtus which has never breathed (atelectasis). In front and above, the pulmonary tissue is anæmic, discolored, soft, emphysematous. The bronchi are injected with blood and filled with mucus and pus; their epithelium is gone, their lumen is frequently dilated. When, after section of the lung, pressure is made with the fingers, drops of pus may be seen to ooze from the openings of the bronchioles. These lesions may be limited to, or predominate in, the inferior and posterior lobes. Under the microscope we see that the bronchial mucosa is infiltrated with embryonal cells and leucocytes; the muscular layer may be destroyed and the bronchi dilated. When there is dilatation of the terminal extremities we find small ampullæ filled with pus (bronchial abscess of Gairdner).

The lesions may remain at this stage (bronchitis and pulmonary congestion). Very frequently, however, this first degree is passed and lobular hepatization appears; then section of the lung will show small spots of irregular or of lozenge shape, of grayish-pink color, hard, and sinking in water (hepatized lobules). At first these lobules are conspicuous from the contrast of their pink color upon a red foundation, but later they become yellowish (gray hepatization). The connective tissue surrounding these hepatized lobules is thickened and condensed; there is a zone of splenization (Charcot), of desquamating or epithelial pneumonia (Bühle), a transition lesion

between congestion and hepatization; the walls of the alveoli are thickened and hyperæmic, their cavities being filled with epithelial cells and leucocytes.

Numerous foci of hepatization may be scattered in a mass of lobar splenization (pseudolobar bronchopneumonia).

Hepatized lobules, or those engorged with fibrous, epithelial, and cellular elements, compose the peribronchial nodules of Charcot. When the nodule is full of leucocytes it projects as a yellow granule, which suggests a tubercle. If several suppurating lobules become agglomerated there will be a larger abscess or vacuole. These are all forms of hepatized lobules. All these lesions, to say nothing of pleuritic adhesions and adenopathies, are disseminated without special order, without apparent subordination, regularity, or system, and the same lung may at the same time exhibit all the stages and degrees of bronchopneumonia. We divide the disease into several varieties: (1) *Capillary bronchitis*, without hepatization, with suppuration of the bronchioles and diffuse pulmonary congestion; (2) *Mammillated bronchopneumonia*, with small, limited, scattered lobules; (3) *Pseudolobar bronchopneumonia* (Barrier) simulating pneumonia. Should the disease become chronic we find the carnification of Legendre and Bailly characterized by indurated tissue, smooth upon section, dry, rose-colored, with fibrous bands of interstitial pneumonia; this is chronic pseudolobar bronchopneumonia with dilatation of the bronchi and peribronchial sclerosis.

Symptoms.

Bronchopneumonia is not, like pneumonia, a cyclical disease; its onset is less well defined, its course less rapid, its termination less sudden. The invasion varies. In some cases the child is seized rather abruptly, the temperature rises to 39° or 40° C. (102.2° to 104° F.), the pulse to from 110 to 160, the respirations to from 40 to 60 a minute; the dyspnœa is extreme. This is the suffocating catarrh, the explosive capillary bronchitis of very young children, which may end fatally before the occurrence of lobular hepatization. The cough is dry, short, and frequent, unattended by expectoration, as the sputum is swallowed; the nostrils dilate and contract; the face is pale, and often covered with sweat; the eyes are dull. There may be excitement, delirium, convulsions. Auscultation reveals fine râles with a slight souffle; the disease progresses rapidly and asphyxia is imminent.

The more usual course is for the onset to be insidious and less alarming. The child has taken cold, sneezes, coughs, and has an ordinary acute bronchitis with a moderate elevation of temperature,

and then suddenly congestive attacks occur which increase pulse, temperature, and respirations, and are sometimes accompanied by *tirage* as in croup. The original focus of disease may disappear, and a remission or calming of the symptoms occur, after which successive exacerbations point to the extension of the process to other parts of the lungs. Secondary bronchopneumonia (to measles, croup, etc.) is not ushered in by an abrupt invasion, but by an aggravation of the general condition, by prostration, and by fever. Upon auscultation we find in the midst of the disseminated bronchial râles a collection of finer râles, a souffle, and bronchophony; percussion gives flatness. The souffles of bronchopneumonia are movable; when due to congestion they disappear or change place from day to day. If they remain fixed in one place, this is a symptom of true hepatization.

The physical and the general signs often do not agree. There may be adynamia and hyperpyrexia with distinctly localized or slight physical signs, which should lead to the suspicion that the focus of disease is deep seated or the affection very severe. On the other hand, we sometimes have extensive superficial or deep lesions with moderate fever, a quiet pulse, and a very slightly disturbed respiration. This indicates either that the disease is superficial and not virulent, or that the child is prostrated with weakness (athrepsia). The thermal curve is irregular, the temperature being usually high at night and low in the morning, but the reverse may obtain. There is no brusk defervescence, no crisis, and the febrile condition is prolonged into two, three, or four weeks or more. From the standpoint of the course and duration of the disease we distinguish a short variety (fifteen days), medium (three weeks), prolonged (one to two months), and chronic (several months or years). The last simulates pulmonary tuberculosis; the children are pale, thin, and cachectic; the physical signs are misleading, as there are moist râles and a pseudo-cavernous souffle; and, in short, everything points to ulcerating phthisis, which does not exist, although there may be bronchiectasis.

The prognosis of bronchopneumonia is very grave, especially if the child be young and weak. In measles, diphtheria, and pertussis, secondary bronchopneumonia is the cause of the majority of deaths. Out of 86 cases of measles complicated by bronchopneumonia which I treated in the Trousseau Hospital in 1895 there were 70 deaths, or 81.39 per cent. When bronchopneumonia is primary and seizes a child in the full vigor of health, as a usual thing recovery follows. Other things being equal, bronchopneumonia is more fatal in hospital than in private practice, because of contagion and the difficul-

ties in the way of isolation in many hospital services. The prognosis is rendered more serious by possible complications, such as abscess, ecthyma, cutaneous infections, gangrene of the mouth or lungs, pleurisy, etc.

Diagnosis.

If the child has a high fever without noteworthy pulmonary signs, hesitancy in pronouncing the diagnosis is permissible. Is there, or is there not a centrally seated bronchopneumonia? Simple bronchitis and influenza may be accompanied by a temporary and movable souffle, due to pulmonary congestion, without there being true bronchopneumonia. True lobar pneumonia in children under two years of age is not easy of recognition, although it has an abrupt invasion, a single focus, a cyclical course, and rapid defervescence. Pleurisy has a special and stationary dulness. Pulmonary tuberculosis may in very young children take on the aspect of bronchopneumonia; we must take note of the predominance of râles at the apex, and the presence of small, indurated ganglia in the neck, axillæ, and groins. Diagnosis is often difficult in both acute and chronic cases. I have seen some in which everything pointed to bronchopneumonia, and in which at the autopsy tuberculosis was found.

Prophylaxis and Treatment.

At the onset, and in robust children only, it is justifiable to prescribe ipecac as an emetic to clear the stomach of the ingested sputum and to combat spasms. Calomel in small divided doses (3 to 5 cgm.—gr. $\frac{1}{2}$ to $\frac{3}{4}$) daily. To stimulate activity of the kidneys we should administer an abundance of fluids, milk, diuretic ptisans, and coffee. We should next stimulate the child, do what is possible to overcome dyspnœa, sustain the heart's action, lower the fever, and facilitate hæmatosis. Stimulation may be accomplished by means of brandy or rum, cinchona wine, acetate or carbonate of ammonium, or ether. Dyspnœa is to be controlled by inhalations of oxygen, cupping, mustard plasters, and cold applications. The heart may be sustained by digitalis, caffeine, strychnine, or sparteine. The temperature may be reduced by cold baths or a cold pack, if the child has a good reaction.

The air in the sick-room must be pure and moist, and may be kept so by sprays of aromatic and antiseptic solutions.

The effort has been made to treat bronchopneumonia by means of the antistreptococcic serum, but so far without success. In my own service, five children suffering from bronchopneumonia following

measles received injections of Marmorek's serum, the ordinary treatment being also continued; two died. In the service of my colleague Netter, of fourteen children treated by the serum alone all died.

The prophylaxis of bronchopneumonia is obtained by antisepsis and isolation. In hospitals all cases of measles, diphtheria, and whooping-cough complicated by bronchopneumonia must be strictly isolated. Any rooms or wards in which there have been cases of bronchopneumonia must be rigorously disinfected. Children suffering from measles, pertussis, diphtheria, influenza, etc., must be antiseptically treated in their nasal, buccal, and pharyngeal cavities, skin, and genitalia. Diarrhœa must be carefully treated; in short, any possible centre of origin of bronchopneumonia must be sterilized.

Lobar Pneumonia.

Lobar pneumonia, true pneumonia, fibrinous pneumonia, is an infectious disease caused by the encapsulated diplococcus of Talamon-Fränkel. It differs from bronchopneumonia by its primary and exclusive location in the alveoli, which it attacks *en masse*, by lobes or portions of lobes.

Etiology.

This affection is rare up to the age of two years, being replaced by lobular pneumonia; in later childhood it is so common that in my own hospital service I have treated one hundred and sixty cases in two years. Henoch has seen lobar pneumonia as early as six months, and it has been found even in the newly born, the pneumococcus having been transmitted through the placenta. The youngest of my patients was fourteen months old. Out of 406 cases Barthez and Rilliet found 242 between two and six years, and 164 between seven and fourteen years. As occasional causes we have cold and variations of temperature in the spring, March, April, and May, in our climate, yielding the largest percentage of pneumonias. Sometimes the disease appears to be transmitted by contagion (epidemics in the family or house). Relapses are not rare. Usually a primary disease, pneumonia is sometimes secondary to influenza, measles, typhoid fever, etc.

Pathological Anatomy.

There are three degrees or stages in the disease, which, however, do not always occur in the typical way: 1st. Engorgement; 2d. Red hepatization; 3d. Gray hepatization. During the first stage there is merely intense congestion; in the second the alveoli are hard,

compact, filled with fibrin, leucocytes, and red blood corpuscles. Upon section each lobule forms a granulation, smaller in the child than in the adult; should the hepatization go on to suppuration these granulations become yellowish, and the lung looks like Roquefort or Stilton cheese. Gray hepatization is rare in childhood, as are gangrene, abscesses, etc. Lesions of the pleura, adhesions, fibrinous deposits, and pus are more frequent. Pneumonia may cause suppurative pericarditis, otitis with purulent infiltration of the cavities of the petrous portion of the temporal bone, and cerebrospinal meningitis. The pus in all of these complicating processes is thick and creamy, and contains pneumococci. In children the lesion is often situated at the apex, more often upon the right than the left side; should the base be affected it is usually upon the left. There is a possibility of double pneumonia.

Symptoms.

The onset is abrupt, and is characterized by vomiting, by fever with or without chills, and in nervous children by convulsions. The temperature may go as high as 40°, 40.5°, 41° C. (104°, 104.9°, 105.8° F.). The face is red, the skin hot; the child is restless and sleepless; there is much dyspnœa and the little patient often complains of a pain in the side. At the same time or a little later, there comes a dry, painful cough without expectoration, the children swallowing the sputum; in older children there is sometimes a scanty, thick, viscid, rusty expectoration. The pulse is very quick, 120, 130, 150 beats per minute, and the respiration is increased to 50, 60, 80, etc. The nostrils dilate and contract. In the first days of the disease there is sometimes an herpetic eruption around the lips and upon other parts of the face. The child may be prostrated and somnolent, or restless and delirious.

The general symptoms are so pronounced as to mask the local symptoms. There may be a true typhoid state, with prostration, dry tongue, epistaxis, and diarrhœa, very suggestive of typhoid pneumonia. The error is absolutely unavoidable when the pneumonia is central, the physical signs not manifesting themselves until the fifth, sixth, or seventh day. In other cases the children are subject to such severe nervous symptoms (convulsions, coma) that the affection appears to be meningitis (cerebral pneumonia of Barthez and Rilliet). Convulsions are most liable to occur during the invasion. The physical signs are conclusive. There is dulness, a tubal souffle, crepitant râles, and bronchophony. Auscultation may yield negative results during the first few days, and in order to hear the diagnostic

sounds of hepatization the child must be made to cough. We must thoroughly examine at the apices and axillæ, if we do not wish to have a pneumonia escape us. The course of the disease is well defined and short; the temperature at once rises to 40° C. (104° F.) or more, and stays there with slight morning remissions for six, seven, eight, nine, or ten days according to the case, falling abruptly to 37° (98.6° F.) or 36.5° (98° F.) in twenty-four to forty-eight hours. Defervescence may be prompt or tardy; some cases of pneumonia appear to be abortive and stop short on the third, fourth, or fifth day; others are prolonged to fourteen, fifteen, and sixteen days. Defervescence may occur at once, or the temperature may reach normal by two or three stages. Critical phenomena, such as sweats, a feeble pulse, and copious urination may occur at the moment of defervescence. On the ensuing days the pulse becomes slower and less regular, and the skin is often covered with sudamina. After a true and apparently durable defervescence, the pneumonic process may return in full strength, and this constitutes relapsing pneumonia. The rudimentary pneumonia of d'Espine would appear to be a pneumonia in which all the symptoms are attenuated.

The *prognosis* in children is good, recovery occurring in nearly all cases. Out of one hundred and sixty patients in the hospital I lost but three patients, the children having double pneumonia with purulent pleurisy or convulsions. Out of two hundred and twelve cases Barthez had only two deaths; Cadet de Gassicourt one out of seventy. The complications which may occur are: serofibrinous or metapneumonic pleurisy, pericarditis, otitis, meningitis, and peritonitis with pneumococci. There may be a generalized pneumococcia.

Diagnosis.

The abrupt invasion, hyperpyrexia, and dyspnœa, even before the finding of the physical signs of the disease, indicate the presence of pneumonia, which is further confirmed by the presence of herpes labialis. Pleurisy is recognized by absolute dulness, and by the results of exploratory puncture. Yet there is a form of massive pneumonia which absolutely simulates pleurisy. By careful auscultation, while the child is made to cough, we can exclude typhoid conditions and infectious grippe. Meningitis may be excluded in the same way, for all these affections have pulmonary manifestations which we must discover. Bronchopneumonia is a secondary disease, with a more irregular and longer course, and with more scattered and inconstant physical signs. Pulmonary congestion is of short duration, and gives but slight physical signs.

Treatment.

Until an antitoxic serum for pneumonia shall have been discovered, no antithermic agent nor any known form of treatment will prevent it from following its course. All that we can do is closely to watch its development, prescribe hygienic measures, and keep the emunctory organs (kidneys, skin, intestines) in a condition of activity. We must at once prescribe a purgative, as the children are always constipated (5 cgm.—gr. ¾—of calomel for each year of age, 10 to 15 gm.—2½ to 4 dr.—of castor oil), abundant fluid drinks, and diuretics (milk, oxymel of squills, etc.). No blisters are to be applied, but only cups, mustard plasters, cold compresses, or an ice bag. To reduce restlessness, hyperpyrexia, dyspnœa, and tachycardia, nothing is so good as the cold bath (25° or 20° C.=77° or 68° F.) lasting five to ten minutes, and repeated every three hours. Should the pulse become weak alcohol, caffeine, or digitalis should be given.

Pulmonary Congestion.

This is not a morbid entity, but is often associated with other diseases, such as tuberculosis, pleurisy, pneumonia, bronchopneumonia, or bronchitis. It may, however, occasionally exist alone and take on special symptoms (splenopneumonia of Grancher).

Etiology.

A chilling of the body, rheumatism, influenza, typhoid fever, or any kind of infection may cause pulmonary congestion. Cadet de Gassicourt has tried to make a separate disease of the primary pulmonary congestion met with in older children, but which may well be classed as abortive pneumonia (Henoch) or rudimentary (d'Espine). He adduces no post-mortem results to prove his point, while in one case Picot and d'Espine found the pneumococcus. As to the splenopneumonia of Grancher, which is less severe and less acute, it forms a sort of intermediate condition between simple pulmonary congestion and pleuropneumonia. It is more than congestion, less than pleurisy or pneumonia; the matter is somewhat obscure. Secondary congestions are better understood.

Symptoms.

In the primary form the onset is abrupt, and is ushered in by a pain in the side, vomiting, fever (40°, 41° C.—104°, 106° F.) just as in the case of pneumonia. But on the following day, or the second day,

the temperature falls to 37° (98.6° F.) and the child is well. Auscultation shows crepitant râles, souffle, and flatness. If the children are old enough to expectorate, there may be sputum like currant jelly in consistence.

Acute pulmonary congestion may consist of relapses with intervals of apyrexia lasting several days, but it is never of very long duration. In one out of three cases Cadet de Gassicourt found herpes labialis. In this abortive form of pneumonia recovery is rapid. When the congestion is secondary, it is manifested by an increase in the temperature and the dyspnœa, and an aggravation of the general condition.

Diagnosis.

There are no absolutely pathognomonic symptoms. We must note the suddenness of the onset, the short duration, and the fugitiveness of the physical signs. In splenopneumonia, a more prolonged form of subacute congestion, the resemblance to pleurisy is so great that paracentesis has frequently been resorted to.

Treatment.

Local revulsion is indicated, with dry- and wet-cups, mustard plasters, cold compresses, and ice bags. Cathartics and expectorants should be administered; tartar emetic, ipecac, castor oil, calomel, or sulphate of sodium may be indicated.

Pulmonary Emphysema.

This disease consists of a dilatation of the pulmonary alveoli (vesicular emphysema). Should an alveolus rupture the air may infiltrate between the lobules under the pleura (interlobular emphysema) and reach the mediastinum and cellular tissue of the neck (subcutaneous emphysema).

Etiology.

Pulmonary emphysema is not a morbid entity but is a secondary result of various affections, and is more rare in children than in adults. The immediate causes are efforts at coughing, dyspnœa, repeated attacks of bronchitis, bronchopneumonia, croup, laryngitis, or whooping-cough, and insufflation of the newly born. Violent coughing attacks may produce acute emphysema. In bronchopneumonia the emphysema is found in the anterior and superior lobes, while the posteroinferior lobes are the seat of atelectasis.

Asthma is a cause of persistent chronic emphysema. Rachitis,

which causes deformities and narrowing of the thorax, is often accompanied by emphysema, as I have several times had occasion to observe.

Pathological Anatomy.

As a rule, emphysema affects only one or two lobes, or portions of such lobes as occupy the anterosuperior part of the thorax. The lung in this region is found to be pale, discolored, soft, non-elastic, concealing the heart and the mediastinum. The alveoli are enlarged; on the surface we may sometimes see subpleural air vesicles of emphysema from alveolar rupture; there may even be pneumothorax. The heart is not dilated as in the adult; the concomitant lesions are bronchopneumonia, diphtheria, etc.

Symptoms.

When the emphysema is acute, as we find it in croup, laryngismus stridulus, whooping-cough, and bronchopneumonia, it is very difficult to recognize it in the midst of the other symptoms. If it persist, we shall find bulging, exaggerated sonorousness, diminished respiratory murmur, prolonged expiration, inspiratory whistling sounds, dyspnœa, etc. We may then have permanent bronchial catarrh with asthma-like attacks from time to time. Should there be complicating subcutaneous emphysema the face, limbs, and trunk are swollen and crepitate upon pressure with the finger.

The *prognosis* varies. When the primary disease is cured the emphysema usually disappears; still it may persist and pass on to a chronic condition. When complicated by subcutaneous emphysema it is very grave. The condition in children must be followed for a long period before a definite opinion can be given, the emphysema of adults often being traceable to early years.

Diagnosis.

In little children the diagnosis is very difficult, their thorax being naturally bulging and resonant. Hernia of the lungs may be recognized by a limited projection which increases with expiration and diminishes during inspiration. Pneumothorax is characterized by tympanitic resonance, amphoric souffle, succussion sound, etc.

Treatment.

At the onset the entrance of air into the lungs must be facilitated by good ventilation of the room and by inhalations of oxygen. Later we may administer iodide of potassium in small but long-continued

doses, or arsenic. The children may be sent to Mont Dore, Eaux-Bonnes, etc.

Pulmonary Gangrene.

Pulmonary gangrene is a secondary infection.

Etiology.

This disease is rare in childhood; yet Louisa Atkins[46] out of thirty-four cases found seventeen in children less than six years of age. The disease is not primary. Except in the case of foreign bodies in the respiratory passages, traumatism, or falls upon the thorax, which may give rise to it, it usually attacks only the debilitated or those exhausted by some other disease, such as athrepsia, measles, bronchopneumonia, diphtheria, variola, pertussis, tuberculosis, pneumonia, or typhoid fever. Out of twenty cases Barthez and Rilliet found thirteen tuberculous.

Pathological Anatomy.

The lesions are circumscribed and lobular rather than lobar, situated within those of bronchopneumonia, giving rise to small cavities filled with putrefying matter. The lung is congested, carnified, and hepatized around these foci. Sometimes the gangrene is situated in dilated and ulcerous bronchi. It may extend to the surface or become diffused, causing putrid pleurisy or gangrenous pyopneumothorax.

Symptoms.

The symptoms are often ill-defined, the autopsy alone revealing the true state of the case. But the general condition attracts attention. There are marked earthy pallor of the face, profound emaciation, hectic fever, a dry tongue, dyspnœa, fetid diarrhœa, and a foul breath. There may be severe pain in the side. Auscultation reveals moist râles, a souffle, sometimes a true gurgling sound. In one out of every four cases there is hæmoptysis. There may be coexistent gangrene of the mouth, throat, and vulva. The sputum (if the child expectorates) is horribly fetid, and contains pus, alveolar débris, and crystals of fatty acids. Traube distinguishes three layers in the cuspidor: a yellowish purulent mass at the bottom, a middle layer of clear serous matter, and an upper stratum of yellow or green froth. The cough is spasmodic and tearing in quality, the dyspnœa severe. The duration of the disease is not prolonged, death occurring after eight, ten, or fifteen days of suffering, the child dying in collapse, or from hæmoptysis or pneumothorax.

Treatment.

The treatment must be tonic and antiseptic. We should give alcohol, quinine, meat juice, milk, and nourishing *purées*. We should also administer inhalations of essence of turpentine, creosote, tincture of eucalyptus, and oxygen; the sick-room must be thoroughly and constantly ventilated; 20 to 30 gm. (℥ ss.–i.) of the syrup of turpentine, with 2 gm. (♏ xxx.) of the tincture of eucalyptus should be prescribed in a potion. Antiseptic sprays in the patient's mouth and in the room should be unceasing. If the gangrenous area is circumscribed and accessible, it should be treated surgically; one or more ribs should be resected and pneumotomy performed.

Pneumothorax.

Pneumothorax consists of an accumulation of air in the pleural cavity. Whether this air originate from within or without, it is soon accompanied by an exudation of serum, pus, or blood (hydro-, pyo-, hæmopneumothorax).

Etiology.

While the affection is rare in childhood, it is perhaps less rare than has been supposed, for it is frequently insidious and latent. Following empyema we may have a pneumothorax without dyspnœa, recognizable only by the occurrence of a succussion sound, for which we must search with care. This occurs habitually in pulsatile empyema, as I showed in my monograph upon this affection in 1895. Generally speaking, pneumothorax follows perforation of the lungs occurring from within outwards and allowing the passage of inspired air; tuberculosis is the usual cause. In purulent pleurisy the lung tissue is destroyed from without and perforation follows strain or violent coughing. Pneumothorax may follow emphysema or insufflation of the lung; in this event it is simple and recovery is rapid. But should the pleura be infected (rupture of a cavity, gangrene, etc.) the pneumothorax will be very grave. Out of fifteen cases Barthez and Rilliet found ten under, and five above five years of age.

Pathological Anatomy.

When the pleura is opened under water we can see the air escaping in bubbles while the lung collapses. Insufflation of the lung will enable us to find the fistula unless it should be cicatrized. There may be several perforations, and the lung may even resemble a sieve (gangrene). The openings, which are usually upon the posterior bor-

der, vary in shape and size; they are sometimes closed by a valve and sometimes lead into the bronchi or into a cavity. Pneumothorax is general or partial according to whether the pleura is free or not of adhesions.

Symptoms.

We establish the bulging, the immovability, and exaggerated resonance of the affected side, the loss of vibration, the amphoric souffle, the metallic tinkling, the *bruit d'airain* (intrapleural tinkling), and the splashing sound when there is fluid. The disease begins either abruptly with a pain in the side and painful dyspnœa, or insidiously without pain, so that it may escape notice. The child, who has more or less dyspnœa, either lies upon the affected side or remains in a sitting posture. Should the pneumothorax be on the left, the heart and mediastinum will be pushed to the right. The general condition may be good, or there may be fever, night sweats, a feeble pulse, and anorexia.

Diagnosis.

Pulmonary emphysema has less marked resonance, less amphoric souffle, gives no splashing sound, and is bilateral. The cavity in the lungs is of less extent, and does not induce a loss of the thoracic vibrations. We must try to ascertain the cause of pneumothorax (tuberculosis, gangrene, pleurisy, etc.).

Treatment.

Should asphyxia threaten, we may puncture and evacuate the air or the pus, introducing sterilized air or antiseptic fluid into the cavity. If there be fever or symptoms of infection, we must endeavor to sterilize the cavity by injecting the compound tincture of iodine, or a ten-per-cent. solution of iodoform in ether. I have had two successful results by this method. Pleurotomy is but rarely indicated.

Serofibrinous Pleurisy.

We must make a distinction between acute inflammation of the pleura with a serofibrinous exudate and the non-inflammatory effusion which occurs in hydrops and is called hydrothorax; the latter is bilateral and unaccompanied by fever.

Etiology.

Serofibrinous pleurisy, which is relatively rare in childhood, may be observed as early as the fifth or ninth month (Henoch) or even in the newly born (Hervieux). Out of 345 cases Barthez and Rilliet

found 199 boys and 146 girls, 101 between 2 and 5 years, 11 between 6 and 10 years, 129 between 11 and 14 years. The possible causes are cold, rheumatism, more rarely traumatism, habitually tuberculosis. To demonstrate the tuberculous origin of the pleurisy, guinea-pigs should be inoculated with the fluid. The disease may be secondary to some pulmonary affection, pneumonia, bronchopneumonia, pulmonary phthisis. In these diseases the lung is nearly always affected, but the pleurisy is often dry. The expressions pleuropneumonia, metapneumonic pleurisy are justifiable. Among the general diseases which may cause pleurisy, we must not fail to mention acute articular rheumatism, scarlatina, measles, typhoid fever, influenza, and Bright's disease. Rheumatismal pleurisy is frequently bilateral.

Pathological Anatomy.

Pleurisy is more often situated upon the left than the right side (166 on the left, 155 on the right, 22 bilateral—Barthez and Rilliet). According to Cadet de Gassicourt, there is one right-sided pleurisy to every three left-sided. We notice in the first place the redness and stickiness of the serous membrane, the false membranes, and the yellowish exudate containing flakes of fibrin. The amount of serum varies between a few grams and one to two litres. By a single puncture I have myself withdrawn two litres (two quarts) of serum from the left pleura of a boy of twelve years. The fluid is usually free, but it may be circumscribed, encysted, situated at the base (diaphragmatic pleurisy), between the two lobes (interlobular pleurisy), etc. Behind the fluid the lung collapses from pressure (atelectasis), and lies along the costovertebral groove; sometimes it is congested, floats, or pushes away the fluid. When the pleurisy is on the left side the heart is pushed to the right, the spleen and stomach are displaced downwards; when on the right side, the liver is pushed down, the whole mediastinum pushed to the side away from the exudation. When the fluid disappears, the thorax may become narrowed and the vertebral column twisted (scoliosis).

Symptoms.

The onset may be acute and accompanied by chills, a high fever, pain in the side, and vomiting, but as a rule it is insidious, and we can judge of its presence only by the physical signs: the thorax on the affected side is but slightly movable, and may be prominent and enlarged; vocal vibrations are abolished; there is dulness on percussion to a variable extent—should the exudation be abundant and upon the left side, the semilunar resonant space of Traube be-

comes dull. A skodaic bruit is found below the clavicle. Auscultation at the onset as well as at the end of the disease may reveal the dry friction sounds of pleurisy. When there is fluid, we hear a soft, superficial murmur in two beats; if the child speaks aloud, there is ægophony.

With a very abundant effusion there is absolute silence. We sometimes hear a gurgling and obtain pseudocavernous signs due to a concomitant bronchitis. There is little coughing, no expectoration, and the child lies upon the affected side. Dyspnœa is inconstant. The fever varies from 38°, 38.5° (100.4°, 101° F.) to 40°, 40.5° (104°, 105° F.), but hyperthermic pleurisy may occur. There is great thirst, diminished appetite, and a rapid pulse. In the rheumatoid forms the course is rapid. In all acute pleurisies the fever persists for a fortnight or three weeks, defervescence then occurring gradually. The course of tuberculous pleurisy is more protracted. The younger the child the more danger is there of the disease becoming chronic or purulent.

Diagnosis.

It is easy to recognize pleurisy and the amount of the effusion by means of the stethoscope and an examination of the neighboring viscera. Yet the mistake has been made of taking pleurisy for massive pneumonia or splenopneumonia, for pericarditis or hydatid cyst of the liver. Exploratory puncture yields valuable data, and also reveals the nature of the fluid, which may be examined bacteriologically.

Prognosis.

The prognosis is good when tuberculosis is not the cause of the disease, and this must be carefully sought for by auscultation and examination of the fluid. The future condition of a child who has had pleurisy is very uncertain. Rheumatic pleurisy is quickly cured. Diaphragmatic pleurisy is the most serious form. Out of 345 cases Barthez and Rilliet noted 313 recoveries, 31 deaths, 1 result unknown. Out of 345 cases of primary pleurisy there were only 2 deaths; out of 100 cases of secondary pleurisy there were 29 deaths. The inference is plain that the prognosis varies with the cause.

Treatment.

At the onset we must give laxatives, purgatives, tartar emetic, and diuretics, and apply cups or mustard plasters to the chest; the action of vesicatories is uncertain, and I never resort to them. Rest in bed and an absolute milk diet should be insisted upon. Digitalis

or caffeine may be given when the pulse is weak or urination insufficient. Should the effusion be abundant, it must be removed by puncture done under strict antisepsis, but if possible it is better to wait until the fever subsides.

Purulent Pleurisy.

In purulent pleurisy, or empyema, the effusion ceases to be clear and transparent, and takes on a thick, turbid appearance, indicating the presence of pus.

Etiology.

Empyema is common at any time during childhood. Out of 241 cases collated by Anna Finkelstein[47] there were 117 children from 4 to 5 years of age, 79 from 5 to 10, 44 from 10 to 15. The ratio of purulent to serous pleurisy is about 29 to 71. Israel out of 208 cases found 59 of empyema. The fluid may be purulent at the start, or become so after a serous pleurisy which in childhood has a greater tendency to suppuration than in adult life. All chronic pleurisies in children are purulent. Pleurisies which are purulent from the beginning follow pneumonia, scarlatina, variola, tuberculosis, and puerperal septicæmia. It has been stated that thoracentesis transforms serous into purulent pleurisies, but this is not the case when the operation is strictly aseptic. Suppuration is really due to an endogenous infection, and not to the surgeon's trocar; it is due to the pneumococcus alone or to that microorganism associated with the streptococcus or the staphylococcus (15 times out of 28, according to Netter), to the streptococcus alone (5 times out of 28), or to the tubercle bacillus (3 times out of 28). While in the adult, out of 100 cases of empyema, 53 are due to the streptococcus and 17 to the pneumococcus, the proportion is reversed in the case of children. In the latter the pleurisy is nearly always metapneumonic, and we may unhesitatingly admit that more than half the cases of infantile empyema are due to pneumococci. We must not forget, however, that empyema may follow pulmonary tuberculosis or gangrene, an ossifluent abscess, an hepatic cyst, etc. I have myself recently observed a case of left-sided gangrenous empyema with pneumothorax occurring suddenly in a boy of twelve years; he was cured by pleurotomy.

Pathological Anatomy.

Empyema is usually unilateral (fifty to five); in the newly born, in cases of puerperal septicæmia or generalized pneumococcus infection it is bilateral. It is more often situated upon the left than the right side (twenty-eight to twenty-two). As a rule, the pus is free in a large

cavity left by the lung, which in a collapsed condition lies along the vertebral groove. It may be circumscribed, encysted either anteriorly or between two lobes (interlobar empyema). The pus is thick, homogeneous, greenish-yellow in color, odorless, as a rule, but sometimes fetid. When it is thick we suspect pleurisy with pneumococci; when seropurulent and not homogeneous we fear tuberculosis. In empyema with pneumococci the false membranes are thick and surround the lung. If purulent pleurisy have followed a serous pleurisy, each successive puncture will show that the fluid becomes more and more turbid and opaque. The amount of pus varies, from a few grams to more than a litre (quart). The lung may be pressed flat against the pericardium as in pulsatile empyema. The ribs may be altered, denuded, covered with osteophytes, the intercostal spaces enlarged, dilated, pressed outwards (empyema necessitatis). The pus may spread subcutaneously even as far as the lumbar region.

Air is often found in the pleura (pyopneumothorax) with one or more perforations. Suppurative pericarditis, peritonitis, and meningitis may complicate empyema.

Symptoms.

The physical signs differ little from those found in serous pleurisy, and frequently a puncture alone will enable us to determine the nature of the fluid. There is sometimes œdema of the thoracic walls or an "empyema necessitatis" will reveal the presence of pus; more rarely aneurysmal pulsations in empyema of the left side (pulsating empyema). The child is of an earthy pallor, and emaciated; it has nocturnal fever and sweating, and prostration. These severe general symptoms point to the presence of pus. There are some cases of latent empyema in which the children to all appearance are in perfect health. Sometimes the course is acute and rapid—this is metapneumonic pleurisy, which in a few days may be well developed and may, especially when interlobar, be terminated by the discharge of pus through the bronchi; in these cases we have pseudocavernous signs, and the child recovers rapidly. Eighteen times out of two hundred and fifty-six cases the discharge came on the fifteenth or twentieth day. Sometimes the pleurisy is protracted and ends in an external opening, leaving an incurable fistula (thirty-three out of two hundred and fifty-six cases). This termination is unfavorable, and should not be waited for.

Pneumothorax frequently complicates empyema. The pus may reach the peritoneum through the diaphragm, or vice versa. Evacuation through an opening into the bronchi is the least unfavorable termination.

The duration of empyema varies; left to nature it lasts one or two months in acute and favorable cases; in other cases it becomes chronic, and lasts six to twelve months or more.

Prognosis.

The prognosis of purulent pleurisy used to be very bad, but owing to the progress of antisepsis we may now say that a cure is to be expected except when tuberculosis is the cause of the disease. A case of empyema with pneumococci or streptococci if taken in time should recover rapidly. In every case we should examine the pus, and ascertain the nature of the microbes found in it; empyema with pneumococci is the least serious. When streptococci are present the disease is less easy to overcome, but is nevertheless curable. The presence of pulsations is not good for the prognosis. In adults the mortality of empyema is thirty-three per cent., but in children only sixteen per cent., or half as great.

Diagnosis.

Protracted duration of an effusion in a young child points to suppuration, while if there be thoracic œdema and a bad general condition, the suspicion becomes a certainty. In any case an exploratory puncture should be made to determine the presence of pus and its bacteriological nature. When the empyema is pulsatile we might be led to suspect aneurysm of the aorta, but the pulsations are weak. Capillary puncture will enable us to recognize hydatid cyst of the liver or lung. I have seen appendicitis give rise to a collection of pus which pushed aside the liver and diaphragm, gave dulness and souffle, and simulated pleurisy of the right side. Exploratory puncture gave no result, and thoracotomy was performed and allowed of the escape of fetid pus, and of the discovery that pleurisy was not the cause of the affection. The child recovered. It is not always easy to determine the amount of the effusion nor its situation. A puncture followed by evacuation will give this information.

Treatment.

Purulent pleurisy having once been recognized, prompt intervention is essential. We should begin by aspiratory puncture, and if the pus flow readily and contain pneumococci, this procedure alone may lead to a cure. But we must not count upon such a result. As a rule, puncture alone is not sufficient to heal the pleura, and we are obliged to resort to thoracotomy with or without resection of the ribs. This resection is necessary in very small children whose inter-

costal spaces are narrow, but unnecessary in older children. The incision of one intercostal space has always served my purpose. Following thorough antisepsis of the skin, and the administration of ether or chloroform, we make an incision about 5 cm. (2 in.) long, of each successive layer until we reach the pleura, which we incise by gliding along the upper border of the lower rib to avoid the intercostal artery. The pus flows, and we introduce a double drainage tube kept in place by a large safety pin, and then thoroughly irrigate with a 1: 5,000 bichloride solution, 1:1,000 chloral solution, 1: 2,000 permanganate of potassium, etc. The dressing is with iodoform gauze and absorbent cotton. The dressing is renewed when penetrated by the effusion, and no new irrigation is made unless there be fever. When the pleura is tuberculous, thoracotomy gives bad results, and we must limit ourselves to a simple puncture. If a fistula persist, Estlander's operation must be performed.

CIRCULATORY APPARATUS.

Malformations of the Heart.

There are but few congenital malformations from arrest of development or endocarditis compatible with life. I shall not take into consideration inversion of the heart, or its transposition to the right side, which are not really diseases, nor arterial aplasia, congenital narrowing of the arteries, the chlorotic aorta of Virchow, because of the obscurity surrounding their anatomical and clinical history.

Congenital Cyanosis; Blue Jaundice.

Sénac, in 1749, studied congenital cyanosis and formulated the theory of the mixture of venous and arterial blood from existing communication between the two sides of the heart, which was adopted by the elder Gintrac,[48] and by the younger Gintrac.[49] Yet Morgagni, in 1765, having noted at autopsies the constriction of the pulmonary artery, came to the conclusion that this was the anatomical underlying cause of the cyanosis. Following his example, Louis, Valleix, Rokitansky, Barthez, Cadet de Gassicourt, and Fallot unhesitatingly ascribed all other lesions to this primordial lesion, and held it responsible for the cyanosis.

Etiology.

Congenital cyanosis is found more often in boys than in girls, and is manifested either in the first few days of life or later. No influence can be attributed to heredity, nor to diseases of, or obstet-

rical accidents to the mother. Syphilis, rheumatism, falls, and consanguinity have each in turn been regarded as etiological factors, but the primary cause is still unknown. As to the mechanism of production of the lesions, this is a matter still under discussion; some claim that there is an inflammatory process, an endocarditis occurring before the heart is completely developed; others, in view of the fact that there are no traces of inflammation found upon the valves, the endocardium, or the large vessels, hold that there is simply a vicious development of the cavities, orifices, and walls of the heart.

Pathological Anatomy.

At the autopsy the heart is usually found to be enlarged, globular, rounded; the apex is blunted; the right ventricle is equal in size to, or larger than the left, and its walls are hypertrophied. It is easy to recognize the fact that the right heart is the cause of the trouble.

Upon opening the heart we find that the ventricles communicate by means of an orifice of variable size, which is situated superiorly, and either perforates the interventricular septum or completely obliterates it. The interauricular septum also is open, Botal's foramen persisting. The infundibulum, valves, and trunk of the pulmonary artery are constricted to a greater or less degree, sometimes to such an extent as to cause surprise that the children could have lived at all. We also note the persistence of the arterial canal, and the dilatation of the arch of the aorta. According to Fallot [50] the lesions in seventy-four per cent. of the cases are four in number: (1) Constriction of the pulmonary artery; (2) interventricular communication; (3) deviation of the aorta to the right; (4) hypertrophy of the right ventricle. This might be called the anatomical tetralogy of congenital cyanosis.

The persistence of Botal's foramen is of slight importance, for it exists in cases in which there is no cyanosis, and is absent in some cases in which there is cyanosis. The cyanosis is not the inevitable result of the mixture of blood, but merely indicates inadequate hæmatosis from interference with the pulmonary circulation. When constriction of the pulmonary artery occurs early in the formation of the heart, it prevents closure of the interventricular and interauricular walls, and of the arterial canal; it is therefore the keystone of cardiac malformations. As a consequence of the pulmonary circulatory disorders induced, the children are liable to contract tuberculosis (C. Paul).

Symptoms.

The characteristic symptom of this affection is the livid, purplish color of the skin and mucous membranes; the cheeks are mottled with blue spots, the extremities cold and cyanosed (hands, feet, ears, nose, genitalia). The fingers are drum-stick, club, and parrot's-beak shape. The mucous membranes, lips, tongue, and mouth are blackened and cold. There frequently is a subnormal temperature (30.5°, 36°—86.9° to 97° F.—in the rectum). The eyes are prominent and injected (exophthalmus). When the child screams, weeps, or makes straining efforts, the cyanosis becomes deeper and generalized throughout the body. It is diminished by rest and heat; cold produces the opposite effect. The child suffers from dyspnœa, coughs frequently and spasmodically, on account of passive pulmonary congestion and permanent bronchial catarrh, while fatigue and bad weather increase this to the point of suffocation. We may have all the symptoms of asystole; a small and rapid pulse, swollen jugular veins, œdema of the lower extremities, face covered with sweat. Death may occur from asphyxia, syncope, or convulsions.

There is marked retardation of both physical and mental development; walking, dentition, and talking are tardy, the size remains small, puberty is delayed, and the child is somnolent, apathetic, and indolent. An examination of the heart shows an increase in size, extensive dulness, a lowering of the apex (fifth or sixth interspace). By palpation we sometimes obtain a systolic fremitus and by auscultation, if the beats are not too frequent, a souffle with the first beat, at the base, and greatest to the left of the sternum. An examination of the blood shows an increase in the number of red blood corpuscles. In a little girl seen in my service there were more than seven million red blood corpuscles to each cubic millimetre. Hyperglobism is the rule, but the hæmoglobin is of diminished richness. Cyanosis usually occurs early. According to Peacock's experience, it occurred 15 times before 1 year, once before 16 months, 3 times at 2 years, thrice at 3 years, once at $3\frac{1}{2}$ years, twice at 5 years, once at 8, 13, and 15 years respectively. The disease is chronic and incurable, death occurring after progressive asphyxia, syncope, hæmoptysis, or phthisis. The children die young, it being extremely rare for such an age as 50 or 60 years to be reached. According to Smith, out of 186 cases, 67 died in the first year, 54 between 1 and 10 years, 41 between 10 and 20 years, 20 between 20 and 40 years, 4 above the age of 40.

Diagnosis.

The facies are characteristic, and the diagnosis can be made at sight. We must bear in mind that there may be some acquired disease of the heart, but a physical examination will usually decide the matter. Auscultation does not, however, always give positive results, and the pulmonary constriction is not always evident. The lungs must be carefully watched for the earliest signs of tuberculosis.

Treatment.

Physical and mental rest are to be enjoined, all fatigue, emotions, and cold are to be avoided. The children must always be warmly dressed, and in winter should be taken to a mild climate. Should there be dyspnœa or asystole, we must give inhalations of oxygen, and prescribe digitalis with cupping of the chest.

Pericarditis.

Inflammation of the pericardium occurs in several forms: it may be dry (acute or chronic) and go on to cardiac symphysis, or there may be a serous, serofibrinous, purulent, or hemorrhagic effusion.

Etiology.

In spite of the opinion of many to the contrary, cold has but little causative influence; rheumatism, on the other hand, often causes pericarditis. According to Bouillaud, the heart in childhood resembles an articulation, and its serous membranes are frequently affected by rheumatism. Rheumatic pericarditis should be given the first place. Next in order, but far removed from it etiologically, come pneumonia, tuberculosis, chorea, scarlatina, variola, measles, typhoid fever, acute osteomyelitis, purpura, and Bright's disease. The microbes found in the exudate are Koch's bacillus, the pneumococcus, staphylococcus, and streptococcus.

Pathological Anatomy.

If the original disease be of recent date, the surface of the pericardium is roughened like the tongue of a calf or a cat, the interfriction of the rugosities of the two parts explaining the friction sound.

In the chronic variety the false membranes have become numerous and sclerosed, and close adhesions unite the visceral to the parietal pericardium. There is cardiac symphysis. The heart is hypertrophied and sometimes suffocated by the pericardial thickening.

Should there be an effusion the fluid may be serous and clear, varying in amount from a few drops to 50 or even 500 gm. (1½ oz. to about 1 pint), or more; H. Roger by puncture withdrew 380 gm. (about 12 oz.) of fluid from a girl of twelve years. In some cases the fluid is purulent or bloody, and we may find tuberculous granulations upon the internal surface of the serous membrane. Pericarditis is not infrequently complicated by endocarditis, left-sided pleurisy, or pneumonia.

Symptoms.

In dry pericarditis percussion gives no information, but on auscultation we obtain a friction sound with both beats of the heart. This sound is not propagated, and is best heard in the middle part of the precordial region. Should there be extensive effusion, there will be a precordial bulging and percussion will give a triangular area of dulness, with its base situated inferiorly. By palpation we cannot feel the apex of the heart, and by auscultation we get only dull and far-away sounds. Sometimes, posteriorly, percussion will give a tympanitic resonance. The pulse is small, feeble, rapid, and sometimes irregular, the respiration short and difficult; there are spasms, faintness, threatening syncope, signs of asystole from compression of the heart, cyanosis, and œdema of the extremities. The cardiac symphysis is revealed by a depression of the thoracic wall with each systole, by a venous diastolic pulse, by a deadening of the sounds. This is a grave lesion which frequently leads to a fatal issue. The duration of pericarditis depends upon its nature; in acute rheumatic pericarditis it may be very short, while in chronic forms of the disease it is very long. Recovery may be complete or incomplete, too often the latter from indefinite persistence of the adhesions. Death may occur from sudden syncope, from asphyxia, septicæmia, or, when there is cardiac symphysis, from progressive asystole.

Prognosis.

The prognosis is serious, yet the disease in both its dry and moist forms is sometimes cured. In rheumatism we often see the pericardium become affected and recover in a few days. In chronic suppurating pericarditis the prognosis is more grave, recovery being very rare. Hemorrhagic pericarditis is usually dependent upon tuberculosis.

Diagnosis.

Many cases of pericarditis pass unperceived, either from the absence of subjective and objective symptoms, or because auscultation is neglected. Pericarditis may be distinguished from endocarditis

by the situation and nature of the friction sounds, the extensive dulness, etc. The friction sounds of pleurisy are slower, larger, synchronous with respiration, but they may be affected by the heart beat and so cause confusion. Cardiac hypertrophy is revealed by the energy of the beats, by well-marked sounds, depression of the apex, and an area of dulness whose base is situated superiorly.

When there is a pericardial effusion, puncture alone will decide the nature of the fluid. Blood points to tuberculosis, purpura, or scorbutus; pus is found in variola, scarlatina, and the various forms of septicæmia.

Treatment.

In the acute variety we must induce revulsion by wet-cups, leeches, and vesicatories. Purgatives and diuretics are to be administered, such as digitalis, caffeine, and the salicylate of sodium; tartar emetic in large doses (15 to 20 cgm. in a potion of 120 gm.—gr. ij.-iij. in ℥ iv.—a teaspoonful every half-hour) is reported by Jaccoud to have given good results by causing disappearance of the serofibrinous pericardial effusions met with in acute articular rheumatism. When the effusion is very abundant, and when medical measures have proved inefficacious, we must have recourse to surgery to prevent the effects of pressure on the heart. A puncture should be made in the fifth intercostal space on the left side, between the sternum and the nipple, about 7 or 8 cm. (about 3 in.) from the sternum. If there is pus, we must incise and wash out as in empyema.

Endocarditis.

In children as in adults inflammation of the endocardium acts upon the valves, causing, according to circumstances, insufficiency or obstruction. The tricuspid valve and the valves of the pulmonary artery are rarely affected, and when they are, endocarditis of the left heart is the primary cause.

Etiology.

In both intra- and extrauterine life any of the infectious diseases may cause endocarditis. We therefore have *congenital* and *acquired* endocarditis. We often meet with children who have a narrowing of the mitral valve without any history of previous disease, and who undoubtedly contracted the lesion during fœtal existence. As a rule, endocarditis is the result of an acute infection, articular rheumatism, erythema nodosum, erysipelas, Bright's disease, scarlatina, measles, typhoid fever, diphtheria, variola, chorea, pneumonia, or acute

angina. Endocarditis usually affects the mitral valve, and next in order the aortic valves, which are most often affected in adult life because of atheroma, alcoholism, etc. Ulcerative endocarditis is a complication of plastic endocarditis, infection being superadded to the original disease.

Pathological Anatomy.

The lesions are the same at all ages; the valves are shrunken, thickened, and roughened, the chordæ tendineæ are shortened, the orifice is either narrowed or widened; the heart is dilated and hypertrophied, and the auricles are filled with blood clots. In the latest stages there are visceral lesions of asystole—large nutmeg liver, congested kidneys, œdematous lungs, hydrothorax, hydropericardium, anasarca. In cases of "vegetative" endocarditis we may have multiple emboli. In a child thirteen years old (Hayem and Duguet) an ulcerative endocarditis caused infarctions of the skin, cellular tissue, kidneys, brain, and lungs.

Symptoms.

Acute endocarditis manifests itself by fever, deadening of the heart sounds, spasms, dyspnœa, and palpitations. Later a systolic murmur is heard at the apex, which is propagated to the axilla, and indicates mitral insufficiency. This murmur is like a gush of steam, sometimes rasping, sometimes musical. Should there be a diastolic rolling murmur with division of the second sound, we shall be able to recognize mitral obstruction which may, moreover, be combined with mitral insufficiency, just as aortic obstruction is found with aortic insufficiency. In the latter case the murmur is loudest at the base of the heart, towards the second interspace, near the sternum; it is systolic in obstruction, diastolic and prolonged in insufficiency. Temporary anæmic murmurs propagated to the carotids must not be confounded with permanent valvular murmurs.

Endocarditis of the fœtus which affects the right heart has in some cases been recognized. Barth [51] upon auscultation of the abdomen of a pregnant woman heard a systolic murmur, and after labor found a vegetative endocarditis of the tricuspid in the child. In a growing child valvular lesions of the heart are for a long time compensated; and asystole is manifested late, unless the heart is doubly affected (endocarditis and pericarditis). We then have the rapid appearance of dyspnœa, cyanosis, anasarca, visceral œdema, and enlarged liver, and the child succumbs promptly. That an acquired valvular lesion may be cured has been proved by experience; sometimes it remains latent, and the endocarditis is discovered by accident without having been revealed by any functional symptom.

Diagnosis.

In the beginning, at the period of formation, the diagnosis is difficult and demands the most careful observation. Later, auscultation reveals the organic lesion and its situation. Anæmia is recognized by softer murmurs at the base, which are propagated to the vessels of the neck. Pericarditis gives a dry friction sound with both beats which is not propagated, but remains stationary.

Treatment.

A rigid physical and mental hygiene must be prescribed. No arduous work is to be done, no difficult career adopted, no overwork of the brain allowed, no bothers and worries, no violent emotions. There must be moderation in everything done. No excess in eating, no alcohol, no hot or cold hydrotherapy must be indulged in. In the earliest stage revulsive measures should be applied over the precordial region; later we must give iodide of potassium, and to avert the results of asystole, digitalis, caffeine, strophanthus, or sparteine. A milk diet and absolute rest in bed should be frequently prescribed at intervals.

Myocarditis.

When the myocardium is affected the serous membranes surrounding it are usually also involved, and it is also almost always involved in the diseases which affect them. Nevertheless, it may be independently diseased in either an acute or chronic manner. We will consider hypertrophy of the heart and myocarditis properly so called.

Hypertrophy of the Heart.

This disease is consecutive to lesions of the valves or of the kidneys. All valvular lesions (insufficiency or stenosis) cause hypertrophy of the corresponding ventricle. In lesions of the left heart the hypertrophy is to the left, and vice versa. It is especially marked (cor bovinum) when the endocarditis is complicated by cardiac symphysis. In chronic interstitial nephritis there is hypertrophy of the left ventricle, shown by an increased strength in the beat and by the "bruit de galop."

Can we admit the existence of a primary, essential hypertrophy, dependent upon growth, and manifested by increased precordial dulness, a lowering of the apex, a murmur, palpitations, and arrhythmical sounds? The subject is still under discussion, this hypertrophy of

growth not having as yet been proved. What we do occasionally see is a strained heart resulting from physical overexertion, from excessive efforts which cause dilatation of the cavities, and segmentation of the muscle fibres. Sudden or rapid death from asystole may be the consequence.

Rachitic malformations of the thorax may favor hypertrophy of the heart by interfering with its expansion; congestion of the liver and dyspepsia may have the same effect either reflexly or from intoxication. We must not mistake the palpitations of nervous and emotional children for hypertrophy. Treatment consists in rest, a milk diet, and the iodide of sodium.

Myocarditis and Degenerations.

All the acute infectious diseases (typhoid fever, diphtheria, scarlatina, variola, measles) may involve the myocardium, cause acute degeneration, and give it the dead-leaf appearance with softening that indicates a grave lesion of the structural elements; this is the "infectious heart." During life myocarditis is revealed by paleness; a small and rapid pulse (120, 130, 150), arrhythmia, faintness, and a tendency to syncope. By auscultation we find that the heart sounds are dulled and weakened without valvular murmur. Acute degeneration may be observed in children whose hearts are normal or have previously been so, but it occurs more frequently in those who have already had a valvular lesion, an endocarditis, pericarditis, cardiac symphysis, or any lesion which predisposes the myocardium to degeneration and renders it vulnerable. In the child we do not have to take into account the chronic degenerations found in adults and old people, which are the result of wear of the arteries (senile atheroma), or chronic intoxication from alcohol, tobacco, syphilis, malaria, and all the results of a long or agitated life. Acute infectious processes have an especial influence upon the myocardium.

In acute myocarditis we must give alcohol, caffeine, quinine, and apply an ice bag to the precordial region. In some cases small doses of calomel (gr. ss.–i.) will work wonders. Absolute rest in bed, a milk diet, stimulating frictions, and inhalations of oxygen are all to be prescribed.

NERVOUS SYSTEM.

Acute Simple Meningitis.

Acute meningitis is called simple when it is not due to a special organism, such as the tubercle bacillus, etc.

Etiology.

This disease may follow traumatism of the skull (fracture, contusion), sunstroke, or the repercussion of an exanthem. It may by propagation follow a cranial osteitis, caries of the petrous portion of the temporal bone, otitis media, inflammation of the facial or acoustic nerve. Erysipelas of the head or anthrax of the face may reach the meninges through the veins and sinuses. Finally, infectious diseases, pneumonia, typhoid fever, puerperal septicæmia, osteomyelitis, scarlatina, and rheumatism may be complicated by acute meningitis, and cases of meningitis have been described with the pneumococcus, the typhoid bacillus, the streptococcus, the staphylococcus, and the bacterium coli commune.

Pathological Anatomy.

We find a tense dura mater, an abundance of cerebrospinal fluid, congested veins, a layer of creamy pus over the convolutions either in whole or in part; the meningitis, in fact, may be diffuse, or limited to the convexity at the base. Pus is found in the pia mater and the subarachnoid spaces. It is thick and homogeneous in meningitis with pneumococci, but it may be fluid and hemorrhagic; the ventricles are dilated.

Symptoms.

If the child is very young and the disease secondary, the affection may be unperceived, or be manifested only by groaning, coma, or convulsions. Older children complain of headache, have vomiting, constipation, and a high fever, which are followed by delirium, restlessness, and finally coma which may be persistent or alternate with delirium. The back of the neck is stiff, the eyes are fixed; we may have repeated convulsions or paralysis. The pulse is rapid (120, 150), the respiration irregular; there is fever and sometimes hyperpyrexia. I have seen a child suffering from traumatic meningitis whose axillary temperature was 42.5° (108.5° F.). Grinding of the teeth, trismus, strabismus, mydriasis or myosis, and photophobia are frequent symptoms.

There are two forms of meningitis: the convulsive, seen especially in early childhood, and the delirious with extreme agitation such as occurs in later childhood. The duration is short, the end occurring in a few days or at most a week. A chronic form has been described which is curable, but causes imbecility or idiocy; but in any event, the prognosis is most serious.

Diagnosis.

The convulsive form of meningitis may be distinguished from true eclampsia by the recurrence of the convulsions, the fever which accompanies, and the coma which follows them. In tuberculous meningitis we have prodromes, an apyretic period occurring between two febrile phases, and we also have an irregular course, remissions, a longer duration, and a more pronounced tendency to coma. The differences, however, are not very marked, and an error is of easy occurrence. Acute encephalitis sometimes accompanies meningitis and is confounded with it. Meningeal hemorrhages are particularly characterized by contractures. We must be careful not to confound true meningitis with pseudomeningitis (meningism) which is a purely nervous or toxic affection in relation with infectious diseases, such as grippe, pneumonia, septic diarrhœa, etc.

Treatment.

Energetic revulsive treatment applied to the head has been advised; vesicatories at the back of the neck, or upon the cranium previously shaved, ice to the head, leeches to the mastoid prominences, while at the same time a purgative, such as calomel, or an enema is given. Chloral or sodium bromide should be administered for the restlessness. To prevent the disease, all wounds of the head, otorrhœa, caries, etc., should be dressed with all possible antiseptic precautions.

Epidemic Cerebrospinal Meningitis.

Cerebrospinal meningitis or cerebrospinal typhus attacks adults, frequently soldiers, and children.

Etiology.

The disease attacks several children in one family, in the same house, city, or region of country. It would appear to be contagious, and the pneumococcus has been found in the exudate, but Weichselbaum, Jäger, and Heubner hold that this microbe is not the specific organism of the disease, and have described a special diplococcus of which they have made cultures and with which they have successfully inoculated several animals, such as goats (Heubner).

Pathological Anatomy.

The disease is sometimes so rapid in its development that the lesions have scarcely time to become pronounced. Pus forms rapidly and a layer of it covers the convexity of the hemispheres and passes

down upon the posterior surface of the spinal cord. It flows into the cavity of the tympanum, and may even invade the articulations, the lungs, pleura, and pericardium. It shows a tendency to become general.

Symptoms.

The invasion is abrupt, and is ushered in by chills, cephalalgia, stiffness of the back of the neck, and sometimes by vomiting and convulsions. The pain in the head is atrocious, and the stiffness of the neck extends to the whole spinal column, and sometimes goes on to opisthotonos. The child rapidly becomes comatose and dies. Herpes labialis has sometimes been noted, and there are nearly always constipation and retention of urine. There is a rapid pulse, a high fever (39° to 40°—102° to 104° F.). The course and duration of the disease are variable, some children dying in thirty-six to forty-eight hours, others battling with the disease for eight or ten days. A few have been known to live for three or four weeks with alternating remissions and exacerbations of the disease. Some children recover, with a prolonged convalescence and profound emaciation. Among the complications which have been noted are conjunctivitis, keratitis, choroiditis, otitis media, pleurisy, pericarditis, parotiditis. The mortality varies in different epidemics: in Sweden and Norway (1854–59) it was fifty-eight per cent.; in the Grand Duchy of Baden it was as low as twenty-nine per cent. The disease is more curable in children than in adults.

Diagnosis.

When the case is isolated and sporadic the diagnosis is very difficult, while, on the other hand, it is easy during epidemics when even the abortive cases may be recognized. We must always bear in mind the possibility of tuberculosis. Atrocious pains in the head, with stiffness of the back of the neck, and herpes labialis suggest cerebrospinal typhus. Lumbar puncture may settle the diagnosis by allowing of a bacteriological examination.

Treatment.

Treatment is the same as in simple meningitis, with isolation in addition.

Tuberculous Meningitis.

Tuberculous meningitis is the most important and most frequent of the encephalopathies of childhood. It was well described in the eighteenth century by Robert Whytt (1768) under the name of

dropsy of the ventricles of the brain, by Capuron as cerebral fever, and by Papavoine who gave it the name of tuberculous meningitis.

Etiology.

The age at which this disease most frequently occurs is that between early and later childhood, between two and five years. The children of tuberculous, nervous, or alcoholic parents are predisposed to it, and we see whole families decimated by meningitis. Yet we also find the disease occurring suddenly amid healthy surroundings. In the latter case it may usually be traced to contagion, the accidental inhalation of bacilli-laden dust, which lodges in the respiratory passages and in the ganglia of the mediastinum, causing the formation of colonies of microbes, which later become disseminated by means of the circulation. Tuberculous meningitis is to be apprehended in children who have a partially cured focus of local tuberculosis (caseous ganglia, gummata, spina ventosa, tumor albus, Pott's disease, coxalgia, etc.).

Pathological Anatomy.

At nearly all the autopsies after death from this disease we find the dropsy of the ventricles which so impressed the earlier physicians, and which causes both external and internal cerebral pressure. We also find inflammatory lesions of the pia mater and the cerebral substance (meningoencephalitis), streaks of pus along the blood-vessels and near the fissure of Sylvius, the chiasm, and the pons. In the same situation we also find disseminated tuberculous granulations in the course of the vessels of the pia mater. These lesions are most often found at the base, but they invade the convexity, the motor zone, the precentral lobule, etc. Large caseous tubercles may be found within the gray matter, and even in the white matter of both cerebrum and cerebellum. The spinal cord itself may be invaded. In Grancher's and Marfan's service, I saw in a little girl of five years a large caseous tubercle in the cauda equina, with hæmatomyelitis, rachitic meningitis, venous ectasia, etc. The symptoms had been sudden and complete paraplegia, with contractures, incontinence of urine and fæces, at the age of two years. Death occurred from pulmonary tuberculosis. The brain was unaffected.

Tubercles are found to coexist in the other viscera, the lungs, liver, and spleen. The mediastinal ganglia are almost always caseous, and show old foci which were the starting-point of the meningeal miliary tuberculosis.

Symptoms.

There are typical forms of the disease with three stages, as described by R. Whytt, and atypical forms which differ from the others. After a more or less prolonged prodromal stage, characterized by an altered behavior, sadness, insomnia, anorexia, and emaciation, the special and important symptoms of the disease appear, to wit, cephalalgia, constipation, and vomiting. There is sensory hyperæsthesia, an avoidance of light and sound, fever (38°, 39°—100.4°, 102.2° F.), a frequent and regular pulse. At the end of a few days begins the second period, characterized by slowing and irregularity of the pulse, and by irregular respirations. The child crouches like a hunting-dog, grinds the teeth, mumbles and cries out at night (hydrocephalic cry), the pupils dilate, the abdomen sinks. The face is alternately pale and red, the pressure of one's nail upon the skin producing a marked meningeal streak. The back of the neck is stiff. The fever falls to about 37° (98.6° F.) and then ascends again in the third stage, the pulse becoming rapid, and convulsions, paralyses (monoplegia, strabismus, unequal pupils), and finally coma appear and the child succumbs. Bouchut and Parinaud, by the help of the ophthalmoscope, found granulations upon the choroid, optic neuritis. The paralyses of tuberculous meningitis are often only partial and temporary, and may alternate with contractures and convulsions. Coma and asphyxia close the scene.

In some cases there are no prodromal symptoms, the child being instantly ushered into the first period of the disease and dying in from eight to ten days. This rapidity, of course, is especially noticed in very young children. At other times there are more or less long remissions which prolong the disease. The average duration is two to three weeks. It is shorter when the meningitis declares itself in the course of another disease (phthisis, peritonitis, etc.), and shorter in infancy than in later childhood.

Prognosis.

This is very grave, the very name of tuberculous meningitis being equal to a sentence of death. Still a few cases in which the disease was localized have recovered, the diagnosis having been confirmed by autopsy at a later date. In the granular and disseminated variety cure is impossible; recovery would prove that the diagnosis was erroneous, and that the disease was a pseudomeningitis.

Diagnosis.

The disease is easily recognized when the symptoms occur in classical order, but very frequently irregular varieties occur, and may be confounded with febrile gastric disorders, typhoid fever, cerebral syphilis, infantile eclampsia, pseudomeningitis, cerebral tumors, intestinal worms, etc. In doubtful cases, d'Espine claims that "static ataxia" may decide the matter (the child, standing in an upright position, sways to a marked degree). Quincke proposes to clear the diagnosis by a puncture between the second and third lumbar vertebræ, which will allow of the bacteriological examination of the cerebrospinal fluid, which may reveal the presence of Koch's bacillus.

Treatment.

Revulsive measures applied to the head (vesicatories, antimony ointment, ice), mercurial inunctions, and iodoform pomade rarely give any help. Calomel, the iodide of potassium, and phosphorus given internally have yielded no better results. As to surgical treatment (puncture, trepanning), it has so far always ended disastrously.

Encephalitis; Abscess of the Brain.

Abscess of the brain following acute encephalitis is the termination of an infectious process localized in the nerve substance.

Etiology.

The abscess in some cases appears to be primary, but as a rule it is secondary to traumatism, a wound or fracture of the cranium, caries of the petrous portion of the temporal bone, otitis, purulent ophthalmia, rhinitis, osteomyelitis, empyema, or measles.

In all these cases there is a blood infection by either the streptococcus or the staphylococcus. The usual cause of cerebral abscess is caries of the petrous portion of the temporal bone, suppurative otitis, and yet the collection of pus is not always contiguous to the initial focus, but may be far away from it, whether in the cerebrum, cerebellum, or pons.

Pathological Anatomy.

An abscess is often preceded by the form of encephalitis known as *red softening*. There is multiplication of the neuroglia cells around the blood and lymph vessels, granular degeneration of the cells, diapedesis of the white blood corpuscles. The pus lodges in

an irregular winding cavity, or in one which is regular and cyst-like; it is thick, smooth, either odorless or fetid. A more or less thick layer of healthy cerebral tissue separates the abscess or abscesses from the primary bony lesion. There are large and small abscesses, the latter and miliary abscesses being the result of pyæmia, the former of some local cause.

Symptoms.

We distinguish three stages: the first corresponding to the encephalitis, which may be abrupt or latent, with or without fever; the second to the collection of pus and tolerance of the abscess; the third of acute reaction, characterized by convulsions, coma, and paralysis. The symptomatology on the whole is seen to be vague and inconstant. The most important sign is the cephalalgia, whose persistence and localization in one spot are pathognomonic. The pulse is frequent and oftentimes irregular; there may be vertigo, vomiting, mydriasis, inequality of the pupils, and aphasia.

Deceptive remissions sometimes occur; a child with a fractured skull may go for fifteen, eighteen, twenty days without exhibiting any untoward symptom, only to fall suddenly into coma or convulsions, and die.

Diagnosis.

Abscess of the brain has no special symptomatology, and often can be diagnosed only by the history of the case, traumatisms, sensory disorders, etc. The affection is a very grave one, and, unless there be intervention, is fatal.

Treatment.

The prophylactic treatment consists in careful treatment of cranial wounds, otorrhœa, etc. An abscess once recognized, we must trephine, open into the brain, and evacuate the pus.

Tumors of the Brain.

The child's brain may be the seat of various neoplastic tumors, which will give more or less marked symptoms according to their situation, rather than to their character.

Etiology.

Tubercles are the tumors most frequently met with in the various parts of the brain (cerebrum, cerebellum, pons). They may be single or multiple, and are more frequent in infancy than in child-

hood. Out of twelve cases Henoch has seen ten between nine months and two years; d'Espine observed multiple tubercles of the convolutions in a child of eleven months; Demme found a cerebellar tubercle as large as a walnut in an infant of twenty-three days whose mother was phthisical.

Other tumors which have been found are hydatid cysts, sarcoma, glioma, cysticercus, syphiloma, etc.

Pathological Anatomy.

Tumors may be found almost anywhere in the gray or white substance of the cerebellum, pons, medulla oblongata, peduncles. Hutinel found tumors in one child in the corpus striatum, the cerebellum, centrum ovale, and spinal cord. The size varies from that of a pea to that of a nut or an egg. The tubercles may be indurated and chalky or soft and cheesy, and they may be surrounded by young granulations, the beginnings of meningitis. Hydatid cysts are found in the ventricles, meninges, and convolutions, and as to cysticerci, Gerhardt found twelve in one brain. Out of 270 tumors of the brain in children Starr found 152 tubercles, 37 gliomata, 34 sarcomata, 5 gliosarcomata, 30 echinococci, cysticerci, or cysts, 10 carcinomata, 2 gummata.

Symptoms.

Even voluminous tumors, if they are situated in a portion of the brain which will tolerate them, such as the centrum ovale or the cerebellum, may remain latent, and this indeed frequently occurs. For months the tumor gives no sign, and then suddenly it will cause convulsions, coma, and death. At autopsies one often finds tumors which were unrecognized during life. Thus Damaschino found a cysticercus in the fourth ventricle of a child of six years, and Parrot a cystic pouch as large as the fist in the occipital lobe of a girl of seven years, who after long toleration of the growth died in convulsions and coma. When any symptoms are exhibited, they are the following: persistent, rebellious cephalalgia on the same side as the tumor, strabismus, ptosis, optic neuritis, paralysis or contracture of a limb, incoördination and titubation, epileptiform convulsions, vomiting, constipation, aphasia, successive paralyses, hemiplegia, hemichorea, vertigo, etc. The disease is often of long duration, its course most irregular; its usual termination is death in coma or delirium, following a meningeal attack. Recovery is possible through calcification and cicatrization of a tubercle.

The *prognosis* is very bad.

Diagnosis.

Should there be localized symptoms, partial paralyses, Jacksonian epilepsy, and persistent headache, the diagnosis would be easy by the elimination of migraine, meningitis, meningeal hemorrhage, epilepsy, and eclampsia. Should there be signs of tuberculosis, with a corresponding family history, cerebral tumor will be suggested. Hereditary stigmata of syphilis will suggest a syphiloma, and an appropriate treatment will be adopted.

Treatment.

In all cases an antisyphilitic treatment should be resorted to, as it is the only one which holds out any hope of success; therefore mercurial inunctions and the iodide of potassium should be given. If the treatment gives no good results and the symptoms increase in severity, we must endeavor to identify the seat of the tumor by the local pain, partial convulsions, paralyses, etc., and by trephining open the dura mater and reach the seat of disease. Horsley and other surgeons have by this means obtained some encouraging results, and we may hope to see cerebral surgery continue in the marvellous progress which it has made in the last quarter of a century, and save many lives which now seem to be absolutely condemned to death.

Meningeal Hemorrhages.

While cerebral hemorrhages are quite exceptional in childhood, hemorrhages of the dura mater, the subarachnoid spaces, and the ventricles are not rare. We may even find extrameningeal hemorrhages, a species of internal cephalhæmatoma, and mixed hemorrhages affecting several of the before-mentioned localities at the same time.

Etiology.

Meningeal hemorrhages are but rarely observed later than the first year of life. They may cause death of the newly born by asphyxia or by convulsions (Dugès[52]). This fact has been proved beyond question by numerous autopsies made in Vienna by Kundrat,[53] and in Paris by Richardière.[54] In these cases the trouble may be due to obstetrical traumatism, prolonged labor, the pressure of a narrow or malformed pelvis. Later on it may be caused by phlebitis of the sinuses, compression of the veins by cerebral tumors, ganglia of the neck or the mediastinum, and hemorrhagic diseases (purpura, athrepsia, malaria, tuberculosis). There may also be pachymeningitis (Vir-

chow, Cruveilhier) in exhausted and cachectic children (rachitis, measles, tuberculosis). In a case reported by Barthez and Rilliet there had been metastasis from the abrupt suppression of a dermatosis of the scalp. Finally we must bear in mind the causative influence of blows and falls upon the head and of violent outbursts of temper (subarachnoidal hemorrhages—Legendre).

Pathological Anatomy.

When there has been compression, violence, fracture, or tearing of the cranial vessels, an *internal cephalhæmatoma* may be produced which is similar to the bloody tumor known as *external cephalhæmatoma*, and curable by spontaneous reabsorption. If the effusion is great, it will spread out upon the surface of the brain, or appear in the form of clots upon one or both sides. The amount of blood varies from 100 to 200 gm. (3 to 6 oz.); its origin is the dura mater, the subarachnoid space, or the ventricles, and we must endeavor to ascertain its starting-point. Later the effusion may undergo degeneration, and become transformed into an hæmatic cyst, or give rise to a form of hydrocephalus. In the newly born, the blood is free, and there is no trace of any inflammatory process.

Should there be pachymeningitis, the blood (as seen by Baillarger) is contained in a false membrane which is adherent to the internal surface of the dura mater. Cruveilhier and Virchow have demonstrated the inflammatory origin. The disease has two stages: (1) Pachymeningitis or inflammatory stage; (2) hæmatoma, or hemorrhagic stage. The seat of disease is on the convexity near the falx cerebri; it is of greater or less extent, and varies in thickness from a mere layer of ecchymosis to a globular tumor containing blood clots, or sometimes an encysted seroalbuminous substance (external hydrocephalus).

Symptoms.

In the newly born, death is rapid, the symptomatology consisting only of asphyxia, convulsive movements, vomiting, and coma. Elsässer has seen a child in this condition live as long as three weeks, and Virchow believes in the possibility of a cure. Pachymeningitis is frequently latent; it may cause general convulsions, which are unilateral, monoplegic (limbs, face), or contractures. It causes delirium, vomiting, and a comatose condition. If the child is old enough it complains of pain in the head. Sometimes there is an apoplectic condition with hemiplegia and fatal coma. In other cases the course is slower; the fontanelle becomes prominent, there is dila-

tation of the pupils, strabismus, and incomplete temporary paralysis, the opening of the fontanelle preventing compression of the brain. There is no fever, but there are deceptive remissions.

When the hemorrhage is subarachnoid and basilar, sudden death may occur from compression of the medulla, which may also happen in case of ventricular hemorrhage. With the exception of these sudden cases, we may say that meningeal hemorrhages are characterized rather by contractures than by absolute paralyses; they are also accompanied by convulsions, dysphagia, arrhythmia, and stertor. At the onset there frequently is hyperpyrexia. In any case the prognosis is very serious and recovery is the exception. Should the child recover it would be hydrocephalic, hemiplegic, or idiotic.

Diagnosis.

The seat of a meningeal hemorrhage is difficult to recognize. We must endeavor to distinguish it from cerebral hemorrhage and softening. The ushering in of the disease by convulsions and contractures which cannot be definitely localized, the non-occurrence of absolute paralysis, but occasional presence of temporary paralyses, distinguishes meningeal from circumscribed cerebral hemorrhages. In meningitis there are fever and abrupt diffuse symptoms. In cerebral tumor we have epileptiform attacks separated by intervals of good health.

Treatment.

By purgative enemata, leeches to the mastoid process, ice and vesicatories to the head, we endeavor to bring about a derivation of the blood.

Thrombosis and Phlebitis of the Sinuses.

Obliteration of the sinuses of the dura mater by phlebitis and thrombosis is no less rare than meningeal hemorrhages, and is a disease of infancy.

Etiology.

Cachectic conditions, athrepsia, and gastro-enteritis predispose to thrombus of the sinuses (Hutinel[65]). It may also arise from erysipelas, anthrax of the face, caries of the petrous portion of the temporal bone, or compression of the superior vena cava. Measles, rachitis, tuberculosis, and bronchopneumonia are predisposing causes.

Pathological Anatomy.

At the autopsy we find blood clots in the right sinus and in the transverse sinuses; the veins are dilated and engorged with black blood; the nerve tissue is œdematous, and there may be meningeal hemorrhages. According to Hutinel, the red softening of the newly born is due to thrombosis of the sinuses. Not only is there thrombosis, but endophlebitis also, as in the phlegmasia alba dolens of women during the puerperal state, and the streptococcus is frequently the causative agent.

Symptoms.

The disease being nearly always secondary gives only vague symptoms which are often overlooked. It is to be suspected when we see a small, cachectic infant fall into drowsiness and coma, with convulsions, strabismus, and stiffness of the back of the neck. At the same time we see the fontanelle become depressed and the bones of the cranium overlap. The superior longitudinal sinus is obliterated and we have epistaxis, cyanosis of the face, and frontal sweating. If the transverse and petrosal sinuses of one side are affected, the corresponding jugular vein becomes empty and collapsed, and there is œdema of the mastoid region. If the thrombosis affects the cavernous sinuses we shall have exophthalmus and palpebral œdema. The disease is of short duration, death occurring rapidly.

Treatment.

Revulsive treatment as in the preceding case should be applied. To prevent phlebitis of the sinuses we must exercise all care in the dressing of wounds, and in the treatment of erysipelas, anthrax, and furuncles of the head and face.

Cerebral Sclerosis; Spasmodic Hemiplegia; Hypertrophy and Atrophy of the Brain; Porencephalus.

We will include under one head all the lesions and malformations of the brain which are characterized by spasmodic hemiplegia, simple or double athetosis, etc. At the hospital of the Salpêtrière, these diseases have been thoroughly studied by Cazauvielh (1827), described under the name of cerebral agenesia or congenital paralysis; by Lallemand (1834), who demonstrated the rôle taken by encephalitis; by Cotard (1868), who admirably described the lesions of hemiplegia; by Raymond (1876), who investigated hemichorea; by Oulmont (1878), who studied athetosis, and by Hammond, of New York.

Etiology.

These diseases are met with in infancy. Out of 100 cases, 19 were traced to fœtal life, 35 to the first year, 29 to the second, 17 to the third, 9 to the fourth, 9 to the fifth, 13 to the sixth, 16 to the seventh (Wollenborg). The causes have been considered to be obstetrical traumatism, prolonged labor, vicious presentations, the use of the forceps; at a later age blows and falls upon the head. Heredity (epilepsy, hysteria, alcoholism, chorea, consanguinity) is an important etiological factor, and Marie includes infectious diseases in the list (eruptive fevers, typhoid fever, hereditary syphilis, etc.).

Pathological Anatomy.

Cotard describes: 1. Yellow plaques or ochre-colored depressions on the convolutions, the latter being retracted, wrinkled, and atrophied. 2. A cellular infiltration, cysts, and cicatrices in the central portion of the hemispheres. 3. Porencephalus, or perforations which may reach into the ventricles. To these lesions, which are vestiges of inflammatory, embolic, hemorrhagic processes, etc., we must add: 4. Lobar sclerosis or chronic interstitial encephalitis of the convolutions leading to atrophy of a lobe or hemisphere. 5. Chronic meningoencephalitis, with adhesions of the pia mater to the nerve tissue. 6. "Tuberous polioencephalitis," characterized by nodules disseminated in the convolutions. Strümpell's polioencephalitis is a localized inflammation of the gray substance. These lesions usually lead to atrophy of the brain, but in some cases the sclerosis causes hypertrophy instead, the convolutions being indurated and enlarged, and the cerebrospinal fluid diminished in quantity. There is proliferation of the neuroglia, strangulation of the nerve fibres and cells, sinuosity of the vessels with enlargement of the perivascular spaces, atrophy of the optic tract and of the opposite lobe of the cerebellum, dilatation of the ventricles, and descending sclerosis of the pyramids. It is highly probable that the cysts are vestiges of old cerebral or meningeal hemorrhages, that the yellow plaques correspond to areas of softening from thrombosis; that the porencephalus (Kundrat) is due to anæmia of the newly born from some lesion of the middle cerebral artery, and that the cerebral sclerosis is also of arterial origin.

Symptoms.

At birth or shortly afterwards, the child is taken with convulsions, then with hemiplegia which is at first attended by flaccidity and later contractures; the paralyzed limbs do not grow, but remain small.

The child's mental growth is retarded, and it may be an idiot. Epileptiform attacks occur, sometimes in rapid succession (status epilepticus). The disease may begin with an apoplectic seizure and loss of consciousness. Although hemiplegia is the most frequently occurring form of paralysis, we may have brachial monoplegia, paraplegia, diplegia. Facial paralysis may be absent. There is neither strabismus nor nystagmus, and the reactions to electricity remain unimpaired. Later symptoms are of two kinds: 1. Hemiplegia with permanent contractures, the limb being atrophied, semiflexed, and stiff, the fingers or toes extended or bent like a claw, the tendon reflexes exaggerated. There is atrophy of the bones as well as of the soft parts, the testicles, breasts, and organs of special sense; puberty is delayed. 2. Hemiplegia or diplegia with single or double athetosis. The limbs in this case are not atrophied, but move with flexibility, without abruptness, and there is no hemianæsthesia. Sometimes the child's intelligence is unimpaired, while in other cases he becomes idiotic; aphasia is rare. Should epileptiform attacks occur, they are preceded by aura (agitation, pain, formication, numbnesss in the paralyzed limb); there is no initial cry, and no loss of consciousness; the convulsions begin upon the affected side and remain most marked there (Bravais-Jacksonian epilepsy). The tongue is not bitten, there is no frothing at the mouth, nor are there involuntary evacuations. The attack ends abruptly, without stertor, delirium, or excitement. We note the absence of vertigo, of *petit mal*, and the relative apyrexia, but in the course of time this partial epilepsy is apt to be merged into the real.

The *prognosis* is grave, a cure being almost impossible.

Diagnosis.

At the onset, in the first attack, doubt is permissible; we may suspect tuberculous meningitis, infantile eclampsia, cerebral tumor. But the later course of the disease removes all doubts. Ordinary chorea, limp chorea, and hysteria are found only in later childhood; syphilitic and obstetrical paralyses, and the atrophic paralysis of childhood are more circumscribed, flaccid, and without contracture. The mental disorders which are so common in this disease confirm the diagnosis.

Treatment.

If the physician is summoned at the onset of the attack, he should apply revulsive treatment to the head, as in the case of meningitis; at a later stage the paralysis and atrophy are to be combated by

means of electricity, massage, and orthopedic surgery. Trephining has been tried, and Sonnenburg obtained a successful result in a case in which the lesion was localized. Craniotomy has not given very encouraging results.

General Paralysis (Diffuse Perimeningeal Encephalitis).

The general paralysis of the insane is usually a disease of adult life; but several cases have been reported as occurring in children.

Etiology.

When an adult is affected with this disease we always look for acquired syphilis, and we usually find it. In children, hereditary syphilis is the cause. Two patients of Dr. Moussou's had syphilis, hereditary in the one, acquired in the other. In the latter case the physician himself saw the primary lesion (labial chancre), as well as the secondary and tertiary stages. General paralysis occurred four years later, the child being in an exhausted condition from whooping-cough, measles, varicella, and bronchopneumonia. Régis states that in twenty-three out of twenty-seven cases we find hereditary syphilis as the cause. There is often a nervous heredity. According to the age of the patients we may describe an infantile variety, beginning at from ten to twelve years of age, and a juvenile variety occurring in adolesents from fourteen to to fifteen years old.

Pathological Anatomy.

At the autopsy we find a leathery appearance of the lateral and fourth ventricles, the surface of which is covered with small fibrous granulations. The dura mater is thickened and has an irritated appearance; the pia mater is opaque and adherent to the convolutions: the vessels are dilated, and there is a red spottiness of the cerebral substance; a multiplication of the cells of the neuroglia with atrophy of the nerve cells; in short, the lesions are clearly those of chronic meningoencephalitis.

Symptoms.

The children are healthy in the first years of their existence, developing in a normal manner up to the age of two, three, four, five, or six years. Some of them have convulsions which reveal the nervous tendency. Later, repeated convulsive attacks occur, meningeal and apoplectic seizures with fever. From this time on, the child's character changes, he is less intelligent, and has periods of giddiness,

vertigo, epileptiform attacks, and paralytic disorders in walking. By gradual stages he falls into dementia with incontinence of fæces, loses his memory and affectional emotions, becomes indifferent and apathetic, has a constant trembling of the hands, and ends by not being able to stand on his feet, but remains in a recumbent position without speaking at all. One, two, three, or four years after the onset death occurs, either during a meningeal attack or following an epileptiform attack. The course of the disease is progressive, and death is the inevitable result in spite of all treatment.

Diagnosis.

The diagnosis is extremely difficult, for one does not expect to find this disease in children, and is far more apt to suspect idiocy and the various forms of cerebral sclerosis. The slow and insidious onset, the absence of localized paralysis, the progressive course of the dementia, and tremulousness will serve as guides to a correct diagnosis.

Treatment.

We must first of all try the mercury and iodine cure. Should this fail we shall have to content ourselves with local revulsive treatment to the head or back of the neck, purgatives, sedatives, and in some cases bleeding. The child should be isolated, and if possible sent to the country.

Hydrocephalus.

This affection consists in a superabundance of the cerebrospinal fluid, and is really dropsy of the brain. Leaving out of the question the acute hydrocephalus related to tuberculous meningitis, we will dwell chiefly upon chronic hydrocephalus which is usually internal (ventricles and subarachnoid spaces), but may be external (subdural spaces). Wheaton saw an example of the latter in a child of seven months who had a membranous sac containing 250 gm. (8 oz.) of serum, between each hemisphere and the dura mater.

Etiology.

Hydrocephalus is usually congenital, in which case it may interfere with labor. It may coexist with malformations such as club-foot, hare-lip, and spina bifida. It may follow the cure of spina bifida, a disease which is to the spinal cord what hydrocephalus is to the brain. In congenital cases Fournier, Sandoz, and d'Astros attribute it to hereditary syphilis. Should hydrocephalus occur at a

later age, it may be due to a meningeal hemorrhage, to meningitis, or compression of Galen's veins or of the superior vena cava. It is in reality a dropsy like any other dropsy, occurring from venous obliteration (R. Whytt).

Pathological Anatomy.

The fluid is clear, contains little albumin and much chloride of sodium; it may be turbid when there is any inflammatory process. The amount varies from a few hectograms to a litre (a few ounces to a quart) or more. The ventricles are dilated, the convolutions pressed outwards and flattened, the central nuclei obliterated; the two lateral ventricles may intercommunicate. In extreme cases the cerebral hemispheres entirely disappear, an atrophied stump being all that remains of the cerebrum. The bones of the cranial vault are pushed apart, the fontanelles are large and gaping, unless the hydrocephalus develop after complete ossification of the bones, in which case the brain is atrophied.

Symptoms.

The most striking thing is the excessive development of the head, which makes the face appear quite small. The veins of the forehead and temples are dilated, the cranium is enlarged, the parietal bosses are prominent. The cranium is sometimes transparent as in hydrocele. The eyes are large, prominent, fixed, expressionless, and sometimes crossed; exophthalmus is in many cases very marked. By means of the ophthalmoscope we may see that the papillæ are atrophied and the retinal veins dilated; vision is frequently abolished. The pupils are either dilated or contracted. Hearing is normal, sensibility dulled and slow. The fontanelles and sutures remain widely open for an indefinite period. The weight of the head is so great that the child is unable to support it and keeps his bed, walking being impossible.

There is mental apathy, and sometimes idiocy; in exceptional cases intelligence is unimpaired. We observe spasmodic and convulsive symptoms (spasm of the glottis, contractures, epileptiform attacks). I have seen a hydrocephalic child of twenty-eight months succumb to intermittent attacks of an asthmatic nature. Death may not occur for three, four, or five years. During the whole course of the disease the digestive functions are normal, the children frequently indeed having voracious appetites. Constipation is the rule. The course of the disease is slow and progressive; the prognosis is very grave, as recovery is altogether exceptional.

Diagnosis.

We must diagnose between hydrocephalus and the large rachitic head or hypertrophied brain which resembles it. In the disease under discussion there are enormous separation of the sutures and increase in the size of the fontanelles. By auscultation we very rarely get the cephalic murmur which is usual in rachitis.

Treatment.

The first thing to be done is to prescribe antisyphilitic treatment —mercurial inunctions and the iodide of potassium. Compression of the head by means of bandages is of little use; puncture of the ventricles may give temporary relief, as may lumbar puncture (Quincke), by evacuating the excess of fluid. Trephining with ventricular drainage has given partial success. The treatment, as we see, is most uncertain and unsatisfactory.

Idiocy.

Idiocy, the varieties and degrees of which are many, may be defined as an arrest or an anomaly in the development of the intellectual faculties. It is the last stage of mental degeneration.

Etiology.

From an etiological point of view, Bourneville classes idiocy as follows: (1) Hydrocephalic idiocy; (2) microcephalic idiocy; (3) idiocy from arrested development of the convolutions; (4) idiocy from congenital malformation; (5) idocy from "hypertrophic or tuberous sclerosis;" (6) idiocy from atrophic sclerosis; (7) idiocy from meningitis; (8) myxœdematous idiocy (absence of the thyroid gland). Idiocy may be congenital or acquired: a child may be born an idiot or become one in the earliest years of existence. A large part in the causation is played by heredity, nervousness, hysteria, epilepsy, alcoholism, insanity, syphilis, and consanguinity of the parents. Traumatism to the fœtus during pregnancy or labor, the forceps, and version may cause idiocy by injury to the brain, by interference with its development (hemorrhages, softening, meningitis). Emotions and fright on the part of the mother enter into the causation. Later blows, falls, and contusions of the head, attacks of meningitis, the various infective processes (eruptive fevers, typhoid) may lead to idiocy, as may epilepsy in infancy.

Pathological Anatomy.

We find three varieties of lesion. (1) Lesions of development; (2) evolutionary lesions; (3) accidental lesions. There is no special form of cranium belonging to idiots; some are asymmetrical and small, others normal or too large (microcephalus, macrocephalus, megalocephalus, hydrocephalus). The sutures may be absent, or be prematurely closed. We find retreating foreheads and flattened occiputs. When there is macrocephalus, it is due to hypertrophy of the brain or to hydrocephalus. We distinguish the following deformities: Platicephalus (head flat at the apex); acrocephalus, (pointed head); scaphocephalus (square head); plagiocephalus (oblique oval); dolichocephalus (elongated); brachycephalus (short). There is nearly always facial asymmetry: the nose is long and depressed at the base; the cheek bones are too prominent or unequally so; the jaws projecting (prognathism); the petrous portion of the temporal bone is flattened; the ears are badly placed or with a defective rim; the palate is ogival, the teeth are defective; there are anomalies of the genitalia. The brain may be completely or only partially hypertrophied (hypertrophic or "tuberous" sclerosis of Bourneville and Brissaud); portions of the gray substance impinge upon the neuroglia.

There may be ventricular hydrocephalus. The lateral ventricles are dilated, or sometimes only one will be enlarged; one cerebral hemisphere may be atrophied and the other normal, or one or both may be altogether lacking.

Microcephalus is more frequent than macrocephalus; there is an arrest of development of the brain or skull, with a small but regular brain, or one which is atrophied in certain parts. Sometimes the gray substance is thinned, the blood-vessels are altered, and areas of hemorrhage, softening, or porencephalus are found. The absence has been noted of the corpus callosum, fornix cerebri, septum lucidum, corpus fimbriatum, and cerebellum. There is no distinctive lesion of idiocy. The lesions are many, and vary according to the case (see the article on this subject in the present volume, p. 270).

Symptoms.

The symptoms also vary greatly; some idiots have the appearance of being quite intelligent, while others bear the stamp upon their faces of their lack of intellect. The former have the acquired idiocy for which there is no cure, the latter are capable of improvement, although they have the stigmata of degeneration. Some are restless,

others inert and stupid; some have rhythmical, cadenced motions, a species of tic—these are automatic; others are terrified at the sight of a strange face. Many are gluttons, being positively voracious. In many cases there are alternations of excitement and depression. Among the anomalies found are strabismus, myopia, hare-lip, syndactylism, paralyses, atrophies, athetosis, cryptorchidism, hermaphroditism, hypospadias, club-shaped penis, delayed puberty, onanism. The hair is often excessive in amount; the mammary and thyroid glands may be hypertrophied. Sensitiveness to touch, heat, and cold is dulled. There may also be hemiplegias, contractures, and epilepsy. The lack of intellect and of sensibility is not always complete, for there are many degrees of idiocy—complete idiots and partial ones; the former are purely vegetative beings, the latter may improve and are capable of being educated up to a certain point.

Diagnosis.

Before two years of age the diagnosis is not easy; we note perhaps that the baby is backward, that he does not walk, nor speak, nor hear, that he cries without occasion, that he does not sleep enough or sleeps too much, that his special senses are imperfectly developed (sight, hearing, taste, smell, muscular sense). We must distinguish between the forms of idiocy (congenital or acquired) and those from myxœdema, hydrocephalus, cerebral sclerosis, etc.

Treatment.

Séguin has invented a method for the education and improvement of idiots, the education being both mental and physical. By means of it the condition of these unfortunates can be greatly ameliorated, and they sometimes may even be rendered capable of earning their living and of being useful members of society. Craniotomy has not given encouraging results.

Epilepsy.

Epilepsy is a convulsive neurosis which begins in childhood, and is characterized by frightful crises which come on at longer or shorter intervals.

Etiology.

Neuropathological heredity plays a great part in the etiology; epileptic, hysterical, insane, and alcoholic parents give birth to epileptic children. Brown-Séquard obtained this heredity in his experiments upon guinea-pigs. Consanguinity has been by some supposed

to account for the trouble. Traumatism to the skull and obstetrical manipulations have been thought to be causative influences of epilepsy and idiocy, as well as of asphyxia of the newly born, which A. Jacobi thinks might be an etiological factor. Some children exhibit the cranial malformations upon which Lasègue laid such stress. Others have true cerebral lesions (sclerosis, malformations), which are at first manifested by partial attacks of epilepsy, and later by real attacks. Infantile eclampsia is not infrequently a mere early manifestation of epilepsy. The latter does not usually occur in infancy; the youngest patient subject to attacks of the grand mal that I have had in my practice was three years of age. The immediate causes of these attacks are sudden emotions, fright, fatigue, overwork, etc. Intestinal worms (lumbricoids, tænia) may either cause epileptiform attacks or reveal a true epilepsy which up that time has been latent.

Pathological Anatomy.

It has been stated that epilepsy is a pure neurosis, without any recognizable lesion. Chaslin, however, claims to have found in true epilepsy a sclerosis of the neuroglia of the convolutions (multiplication of the neuroglia bundles without lesion of the vessels). This alteration, which he calls gliosis, would prove a congenital malformation of the external layer of the blastoderm, and would explain the influence of heredity. But this view is not held by all.

Symptoms.

Before the occurrence of the grand crisis, various nervous symptoms have been noted: eclampsia, nocturnal incontinence of urine, inattention, vertigo, petit mal. Then comes the grand mal; a cry, pallor of the face, a fall with loss of consciousness, tonic and clonic convulsions, frothing at the mouth, and stertor. The whole lasts from two to three minutes, and upon awakening the child remembers nothing of what has occurred. The attack frequently comes on at night, the only symptoms being enuresis nocturna and biting of the tongue. The temperature is elevated during the attack. The intervals separating these convulsive manifestations vary; some children go for months or even for years without one, others have them every two months or every month. During the intervals between attacks the general health is good and the mind clear, but in the long run, especially if the convulsions occur frequently, the character and mind deteriorate. Insane asylums are filled with epileptics. In some cases the attacks occur almost uninterruptedly (status epilepticus) and death may follow. Death sometimes occurs from an

accidental fall into water or fire, the epileptic never being able to foresee when or where an attack may occur, nor to help himself in an emergency.

Diagnosis.

The epilepsy which is symptomatic of a cerebral lesion (Bravais, Jackson) is preceded by aura, consciousness is not abolished, the convulsions begin in one limb, being restricted to or most marked on one side of the body; the tongue is not bitten. In epilepsy due to worms the attacks are of longer duration, but less severe, and yield to treatment by anthelmintics. In infantile eclampsia we have the complete symptomatology of epilepsy, but it occurs during the first months of life, while epilepsy belongs to later childhood. Hystero-epilepsy is not always easy of recognition—we must look for the stigmata, areas of anæsthesia, etc. Finally, epilepsy may be masked, manifesting itself by abnormal symptoms, incontinence of urine, salaam convulsions, vertigo, etc.

Treatment.

Treatment consists of relative isolation, hygienic measures, life in the open air, manual work, and avoidance of mental overwork. Bromide of potassium, to the extent of 2 to 6 gm. (30 to 90 gr.) a day should be given to suppress or avert attacks, the treatment being interrupted from time to time. Should there be partial epilepsy, antisyphilitic treatment should first be tried, and then trephining. Bromide of camphor relieves the vertigo, and antipyrin is a good sedative. Hydrotherapy is sometimes useful.

Chorea Nutans; Salaam Convulsions.

This is a neurosis of infancy, characterized by nodding movements of the head. Some have considered it to be related to epilepsy.

Etiology.

The affection is rare, and is seen only in children who are nervous, restless, and of neurotic or alcoholic origin. According to West and Féré, this neurosis is connected with epilepsy. I have myself seen four cases (boys of four and five months, girls of ten months and three and one-half years). In three of the cases there was a nervous, in one a syphilitic heredity. Kassowitz considers rachitis to be a cause.

Symptoms.

The head makes movements of flexion, either anteroposteriorly or laterally, to the number of twenty, thirty, or fifty a minute. The two movements are sometimes associated, giving circumduction. There may be at the same time winking, shrugging of the shoulders, and arm movements. Henoch finds that the children rock like the Barbary apes. Rolling of the eyes, nystagmus, and strabismus have been noted. The spasms come on in regular attacks, and in the interval the children are merely restless and uncertain in their movements. If we attempt to stop their motions they scream and cry and become distressed. During sleep they are quiet. In some cases the motions are permanent, lasting for days or weeks at a time. The cases which I saw were of this kind.

A boy of seventeen months (Gautiez), whose mother had eclampsia, would become suddenly pale at the beginning of the attack, drop whatever he might happen to be holding, flex his head and thorax, and push his hands forwards, all this occurring thirty times in succession. He was also subject to partial attacks (pallor, fixedness of the eyes); there was no loss of consciousness. This condition persisted without change for eight months. There are many degrees if not varieties of chorea nutans; some cases are curable and unrelated to epilepsy, others are merely the small change, so to speak, of that terrible and incurable neurosis. The prognosis, therefore, varies according to circumstances.

Treatment.

Bromide of potassium, tepid baths, baths of aqua tiliæ.

Convulsions; Eclampsia.

Eclampsia, consisting of epileptiform convulsions, is the most ordinary neurosis of infancy.

Etiology.

Here, again, heredity plays a great part, and the children of parents who are nervous, insane, epileptic, hysterical, or alcoholic have a predisposition to convulsions. I have seen families of hysterics and alcoholics decimated by eclampsia. Tuberculosis and hereditary syphilis are also predisposing causes, the same being the case with puerperal eclampsia. Heredity creates a predisposition, but the accidental causes inducing the attack are such as indigestion, dyspepsia, gastroenteritis, rachitis, eruptive fevers, and pneumonia. Although

dentition has been considered as a cause, it is doubtful whether such be the case. Infantile paralysis and cerebral sclerosis may be ushered in by convulsions. Anything causing organic weakness, as athrepsia, syphilis, or congenital feebleness, predisposes to convulsions. Craniotabes, or a softened occiput, may be observed in some sufferers from eclampsia, but it is rather a proof of the condition than the cause of it. Convulsions may be brought on by a mere prick, a burn, an accidental irritation of the skin or mucous membranes, retention of urine, phimosis, a polypus, invagination, intestinal worms, a foreign body in the air-passages, digestive tract, or ear, a process of intoxication, pertussis, or croup. According to Myà (of Florence), eclampsia is due to an autointoxication from hepatic insufficiency. Any disease of the brain or its membranes may cause convulsions. All these causes act in the same way; whether the convulsions be idiopathic, toxic, or reflex, the pons Varolii (convulsive centre of Nothnagel) is involved. In later childhood its action is held in check by the brain, and convulsions become exceptional. Their special period of manifestation is between birth and the second year of life, and they are especially to be feared in the first months.

Pathological Anatomy.

There is no one constant lesion. The autopsy may give absolutely negative results, or reveal lesions which may have been the starting-point for convulsions without being absolutely responsible for them; such as hepatization of the lungs, congestion, enteritis, cerebral tumor, meningitis, etc.

Symptoms.

The onset is abrupt whether the eclampsia occur in a healthy or a sick child. The infant suddenly becomes pale, its eyes are fixed, and it becomes stiff; the eyeballs vacillate or roll upwards, the whites only remaining visible, or there may be strabismus; the face becomes twisted and contorted, the labial commissures contract at rapid intervals, and a frothy mucus flows from them; the back of the neck is stiff, the head thrown back. The limbs stiffen, the fingers are flexed upon the palm, the thumb being pronated, and the forearm is the seat of rapid movements. The cyanosis of asphyxia follows the pallor, the child loses consciousness, and has involuntary evacuations. At the end of two or three minutes the respiration becomes noisy and stertorous, and the child falls into a comatose condition, with relaxed muscles. The convulsions may be partial, limited to one side or limb, to the face or the eyes, in which case the attacks

are incomplete. After the seizure the child is quite well, but the convulsions may be repeated, and follow each other almost without interruption (status epilepticus). When eclampsia ushers in an acute disease it is single, while in cerebral affections it is readily repeated. While death may follow a first attack, it usually occurs only after a series of attacks. A cure is not rare in uncomplicated eclampsia, *sine materia;* but is altogether exceptional in the convulsions which are symptomatic of grave lesion of the brain. At the onset of the disease they need cause no anxiety, but the opposite is the case when they occur towards its close. In any case, a guarded prognosis should be given.

Diagnosis.

Eclampsia can be easily recognized. It may be distinguished from spasm of the glottis by the jerky movements which accompany the loss of consciousness; in spasm of the glottis there is merely apnœa, with cyanosis, without muscular twitchings. In tetany the stiffness is limited to the extremities, and we see the peculiar "main d'accoucheur," without there being any loss of consciousness. In epilepsy the symptomatology being the same, the age of the child alone will settle the diagnosis.

We should always endeavor to find the cause of the convulsions. If there be much fever we suspect the invasion of some acute disease. If there be indigestion, digestive troubles, vomiting, or intestinal worms, we can consider them responsible for the eclampsia. A lesion of the brain is to be suspected if the convulsions are repeated and alternate with paralyses.

Treatment.

At the moment of the attack the clothing must be loosened, plenty of air must be admitted to the room, and an enema containing glycerin, oil, or table salt should be given. To calm the spasm we may make pressure upon the carotids, give inhalations of chloroform or ether, administer a chloral or musk enema, give friction or flagellation, or immerse the child in a cold bath. If malaria is suspected give quinine. We try to prevent a return of the attack by combating the cause, giving anthelmintics if there are worms, treating any dyspepsia or constipation, calming the nervous system by bromide of potassium, baths, etc. We must bear in mind the possibility of hereditary syphilis and prescribe mercurial inunctions.

Hysteria.

Hysteria is a neurosis which attains its full development only in adult life, but which exists in germ form in children.

Etiology.

Hereditary influence is undeniable. It may act directly or indirectly, according to whether the hysterical children have hysterical parents, or whether the disease is derived from some other neuropathic affection (epilepsy, chorea, migraine, alcoholism, etc.) Briquet (1854), having investigated the history of 1,103 persons (403 men, 673 women) composing the families of 35 hysterical patients, found hysteria 214 times, epilepsy 13, insanity 16, somnambulism 3, convulsions 14, apoplexy 10. Bernutz knew an hysterical mother who had six hysterical daughters. After heredity we have to consider education, moral hygiene, sensory excitements, sharp mental emotions, imitativeness, sorrow, disillusions, etc., in the etiology. Hysteria may be associated with other neuroses, as chorea, epilepsy, or idiocy. In children predisposed to the affection, great care should be exercised that they be not exposed to the excitement of ill-chosen literature, the influences of mysticism, spiritualism, etc. As Charcot has well demonstrated, hysteria is as common in boys as in girls. Jewish children are especially apt to be affected by it. It may occur at a very early age; I have seen it at two years, and Guyot reports a case of hysterical paralysis at four years.

Symptoms.

Hysteria may simulate all nervous diseases, and even some others; it is often abortive and should be suspected whenever a case presents peculiar and exceptional symptoms. For example, a boy or girl may refuse to walk, complain of pain in the hip, and limp; we at once suspect coxalgia, but there is neither atrophy, deformity, nor shortening of the limb, and under chloroform muscular contracture is found to be the sole cause of the affection; this is hysterical coxalgia. There are often stigmata to guide us, such as cutaneous and sensory hemianæsthesias, oöphoralgia, diminution of the visual field, hysterogenic points, and pharyngeal anæsthesia. There may be lethargy or somnambulism. If the child is too young for any of these symptoms to be present, he may be restless, irritable, and bad-tempered, sly and deceitful. Some children refuse to eat and become profoundly emaciated (hysterical anorexia). In the Temperance Hospital of London Collins treated a girl of seven and a half years, who,

as the result of hysterical anorexia, weighed only 15 kgm. (33 lbs.). After two months of treatment her weight had increased to 22 kgm. (48 lbs.). Some children refuse to talk (hysterical dumbness), others stammer, tremble, or are affected with rhythmical chorea. Finally, there may even be attacks of hysteroepilepsy; falling, convulsions without loss of consciousness, "clownism," passion, hallucinations, delirium, catalepsy, hypnosis.

Diagnosis.

The diagnosis is often difficult, and we are obliged to base it upon the neuropathic symptoms, and the family or personal history. It is not always easy to distinguish hysteria from epilepsy; in hysteria there is no fever, there are no involuntary evacuations, nor bloody frothing at the mouth, nor stertor. If there be contracture, lameness, or muscular atrophy we are apt to suspect coxalgia or myelitis. We must be on our guard against simulation.

Treatment.

We must not give an excess of internal medication in hysteria, although during the attack we are justified in giving the bromides or antipyrin to obtain control over the nervous system. The children must be isolated, taken away from their usual surroundings, and given a change of air and scene. Should the case be a severe one, it must be treated in a sanatorium by hydrotherapy, massage, static electricity, etc.

Sydenham's Chorea.

Chorea, or the dance of St. Guy or of St. Vitus, differs from other convulsive neuroses in the arrhythmical nature of the movements which although conscious are involuntary, and cease during sleep.

Etiology.

Chorea is essentially a disease of childhood, but is exceptionally met with in adults and in pregnant women. A form of congenital chorea has been described (which we must not confound with athetosis), which appears at birth and goes on to later childhood. The greatest number of cases of chorea are met with between the ages of seven and fourteen. It has been seen at six, five, four (Henoch), and three years (Comby), but this is rare. Out of 334 cases reported by Barthez and Rilliet, 23 were between three and six years, 134 between seven and ten years, 109 between eleven and fourteen years, and 8 between fifteen and seventeen years.

Out of 120 cases in my own practice, I found 1 at three years, 1 at three and a half years, 3 at five years, 67 between six and ten years, 49 between ten and fifteen years. In these 120 cases there were 45 boys and 75 girls. This predominance of the female sex is always noticeable; according to Barthez and Rilliet, in every four cases three are sure to be girls. Germain Sée states that the proportion is one boy to two girls. West out of 1,141 cases found 347 boys and 794 girls.

In chorea, as in all other neuroses, we find a similar (chorea of the parents) or a dissimilar (any neurosis) heredity. The hereditary chorea of Huntington, a disease of adult life, has nothing in common with ordinary chorea. Chorea is closely related to hysteria; among twenty-seven girls affected with chorea, Marie found the "ovarian point" nineteen times. I have also found this ovarian point in several cases, but I consider it a point of lumboabdominal neuralgia. Pharyngeal anæsthesia is of frequent occurrence; hemianæsthesia is rare. In a case of Raymond's it coexisted with amblyopia. The causative agents of chorea are many; imitativeness, mental emotions, fright, falls, and acute diseases. G. Sée and H. Roger have laid stress upon the influence of acute articular rheumatism, and consider chorea as a rheumatic disease. Now in my own experience I have not found rheumatism in one case out of ten in the personal or family history of my patients; Ch. Leroux, out of one hundred and sixty-two cases, Perret and Devic out of two hundred and thirty-five, report only a few cases of rheumatic chorea. The disease is therefore not a simple cerebrospinal localization of rheumatism as H. Roger holds, but an anatomical neurosis belonging to the large neuropathological class. Joffroy considers it to be a cerebrospinal neurosis of growth. The cardiac murmurs often heard do not necessarily imply rheumatism, for they are frequently anæmic, or when organic they may be due to some infection. Chorea may follow any infectious disease, such as the eruptive fevers, mumps, typhoid, etc. Triboulet considers chorea to be an infectious disease due not to any one special microbe, but to pathogenic organisms which vary according to the case. Relapses are not infrequent; I have seen four relapses in a little patient; Henoch has seen six; Barthez and Rilliet eight. They occur more often in girls than in boys, seventy-seven out of eighty-five cases being girls.

Pathological Anatomy.

Hughlings Jackson and Tuckwell have held that endocarditis preceded the chorea and that the latter was due to emboli, but autopsies give negative results, and no constant lesion has been found. The

congestion of the vessels of the brain (Dickinson) is cadaveric; the lesions of the meninges, corpora quadrigemina, cerebrum, and cerebellum, the effusions, cysts, and tubercles found are merely incidental. Balzer lays stress upon the unusual refractive power of the large cells of the anterior cornua; Broadbent considers the optic layers and the corpora striata to be responsible. But as yet we have no proof in support of these views.

Symptoms.

The disease may declare itself abruptly after a fright, or be preceded by psychical prodromata, such as an unreliable temper, inattentiveness, distraction, awkwardness, insomnia. Incoherence in minor acts next appears; the child upsets things, if a girl pricks herself while sewing, writes badly, is subject to slight jerking movements, and makes grimaces which are often considered to be result of mischievous intent and receive unmerited punishment. The disease becomes more and more pronounced, the child jumps, moves his arms like a dancing-jack, falls, hits things as he passes by them; he is no longer master of his movements, which become more and more exaggerated by efforts, emotion, or walking. These motions are incoherent, arrhythmical, involuntary but conscious, and are suspended during sleep. Speech is jerky and difficult; there may be inarticulate cries, hiccough, and dysphagia. Alternate dilatation and contraction of the pupils have been noticed, as well as nystagmus (chorea of the eyes). The pulse frequently is irregular, and there may be fever. Very often the movements are more marked on one side. Out of 273 cases Barthez and Rilliet found 168 of bilateral chorea, 27 more marked on the left side, 23 on the right, 29 limited to the right, 26 to the left. In slight cases walking is possible. In severe cases the patients are obliged to keep their bed, and often bruise themselves against its bars. The reflexes are unaffected. There may be more or less complete paralysis of one side or limb—this is the limp chorea (chorea of Wills and Gowers); the child drags one of its legs, or lets one of its arms hang loosely (Ollive[56]). Sensory troubles are inconstant, hemianæsthesia is rare, pharyngeal anæsthesia common; painful spinal and iliac points may be noted. Other neuroses may precede, accompany, or follow the chorea (nocturnal enuresis). Mental troubles have been noticed, such as aphasia (West) and insanity (Marcé). Chorea may be complicated by anæmia with a murmur at the base of the heart and in the vessels of the neck, mitral or aortic endocarditis, pericarditis, or pleurisy. In severe cases contusions may be followed by erysipelas, phlegmon, anthrax, eschars. The disease is of variable duration, lasting from a few

weeks to two or three months. As a rule the patients recover, but they may have relapses. The prognosis is grave because of the cardiac complications and because of the nervous taint which it reveals.

Diagnosis.

The jerky and arrhythmical movements permit us to eliminate hysterical chorea, athetosis, multiple cerebral sclerosis, electrical chorea. The last named, which has been thoroughly studied by J. Bergeron, in France, is characterized by rhythmical shaking movements, which resemble hysteria. Dubini's chorea is a more serious disease, possibly a form of pernicious malaria.

Treatment.

The patient must be made to rest in bed, away from all physical or mental excitement. He must be isolated from his companions in an airy, cool place. Mild, dry climates are suitable, but the seaside is not. Stimulating food and alcoholic drinks and coffee are to be forbidden, milk and eggs to be given. The bowels must be kept open by laxatives or enemata. In slight cases hygienic measures, with the addition of a few sulphur baths, and hypnotics (chloral, trional, opium) will be all-sufficient. In very severe cases the nervous excitement must be controlled. This we accomplish by means of large doses of antipyrin (3 gm. to 6 gm. a day, 45 to 90 grs.) in doses of not less than 1 gm. (30 grs.) each. In from eight to ten days this treatment will bring about a cure, but is likely to be attended by erythema. Arsenic is even more efficacious and more rapid in its action: 1 cgm. (gr. $\frac{1}{6}$) of arsenious acid in a 1–1,000 solution (Bondin's fluid) should be given, that is to say, 10 gms. ($2\frac{1}{2}$ dr.) of this fluid in 120 gm. (4 oz.) of some pleasant menstruum, to be increased by 5 gm. ($1\frac{1}{4}$ dr.) at a time up to 30 or 35 gm. (1 oz.), after which we decrease to 10 gm. ($2\frac{1}{2}$ dr.). With this treatment chorea can be cured in eight days, but we are liable to have gastric intolerance, polyneuritis, and myelitis. Cold applications in the form of a pack, or a bath at 20° (68° F.) are very sedative in their action. Hypnotic suggestion has been successful in some cases. Tartar emetic and strychnine are but little used at the present time, and the bromides are unreliable.

Tetany.

Tetany consists of an intermittent contraction of the extremities, described by Dance[57] under the name of intermittent tetanus, by Constant[58] as essential contraction of the extremities, by L. Corvisart[59] and by Trousseau under the name of tetany, which is still given to the affection.

Etiology.

Out of eighty-seven cases, of which fifty-three were boys, Barthez and Rilliet found thirty-six children of two years. The disease is of the winter season. It is secondary to chronic diarrhœa, athrepsia, rachitis, whooping-cough, typhoid fever, and rheumatism. In fifteen children under one year (Baginsky), who were ill nourished and weaned too early, the cure of their digestive disorders brought the contractures to an end. The disease appears to be caused by an autointoxication, and Bouveret an Devic, in case of dilatation of the stomach, found a poison which causes convulsions and predisposes to tetany. Among the causative agents are cold, emotion, traumatism, indigestion, worms, intestinal invagination. Relapses are frequent. The effort has been made to prove that tetany and hysteria are the same. Oddo and Sarles[60] have found indican in the urine, and consider digestive disorders as the cause of tetany. According to Escherich it is identical with spasm of the glottis, and Kassowitz attributes it to craniotabes. The relation between tetany and rachitis and craniotabes is explainable only by the intermediary action of the digestive tract, in which are elaborated the poisons which act upon the bones and the nervous system.

Symptoms.

The fingers become flexed upon the palm, the phalanges remaining in extension, the thumb to the inside covered by the other fingers (*main d'accoucheur*); there is either moderate or great stiffness, but it is rarely invincible. The wrists are flexed in pronation, the muscles are outlined under the skin, the electrical contractility is exaggerated. The lower extremities become included in the disease, the feet being in extension pointing inwards, the muscles of the leg as stiff as those of the forearm. The arm and thigh are rarely affected. The disease may, however, become generalized so as to resemble tetanus. The mind is not affected. According to Trousseau, an attack of tetany may be induced by energetic pressure on the nerves or vessels of the limbs (Trousseau's symptom). The attacks

recur with remissions of varying length—including these remissions the whole thing may last for several days or even weeks. It may be accompanied by fever. As possible complications we have convulsions, spasm of the glottis, and strabismus. The prognosis is serious, although recovery is the rule.

Diagnosis.

Tetany is to be distinguished from tetanus, in which the spasms are generalized, and from opisthotonos. The spasms symptomatic of cerebral lesions are permanent and without remission, the same being the case with hysterical contractures. In addition to Trousseau's symptom, there is Weiss' symptom in tetany, namely, "fulgurating spasm" of the face obtained by percussion at the external canthus of the eye.

Treatment.

Prolonged tepid baths should be administered, cups applied the whole length of the spinal column, and ether or chloroform inhaled. Bromides should be prescribed, as well as the continuous electric current. Above all, there should be thorough antiseptic treatment of the digestive tract (calomel) and of any gastric dilatation (lavage of the stomach), and nursing rather than artificial feeding is to be recommended.

Little's Disease.

Under the name of *infantile spasmodic tabes dorsalis*, or Little's disease, there has been described a congenital spasmodic rigidity of the limbs, accompanied by cerebral disorders which may go on to idiocy.

Etiology.

This disease is especially to be observed in children born prematurely, or in those whose birth has been difficult (forceps, abnormal presentation, asphyxia from compression of the funis, etc.). Little lays great stress upon these factors. We may add to the list: traumatism during the first months of life, a nervous heredity, consanguinity, disorders of or lack of development of the brain, infections in utero, diseases of the fœtus and of the newly born.

Pathological Anatomy.

Erb and Charcot, as a result of researches into the spasmodic tabes dorsalis of adults, held that there is a primary degeneration of the lateral columns of the spinal cord. F. Raymond has shown that

the result of post-mortem examinations did not admit of this view. In the one case the cord would be intact, in another there would be a disseminated sclerosis; in a third, a bulbar sclerosis (Picot and d'Espine). In a girl of ten years Strümpell found hydrocephalus; J. Ross saw porencephalus in another case.

In the adult spasmodic tabes dorsalis is not a morbid entity (Marie), but may be symptomatic of various affections of the spinal cord (multiple cerebral sclerosis, lateral amyotrophic sclerosis, transverse myelitis). In the child the disease truly exists, and whether the brain have been the seat of compressions, of contusions, or of capillary hemorrhages, whether it be malformed, or have been infected within or outside of the uterus, there is a resulting arrest of development of the anterior pyramids. This part, which attains its full development only at the age of three years, is an exposed point in all cerebral diseases of the fœtus and the newly born.

Symptoms.

The first thing to be observed is the spasmodic rigidity of the lower limbs, which either prevents the child from walking at all or obliges him to walk upon his toes in the position of pes equinovarus. The spasm prevents separation of the thighs; it is less when the child is resting in bed than when he is on the floor. It is diminished in intensity at one moment, only to become exaggerated under the slightest excitement. The reflexes are increased, there are tremulous movements of the lower extremities. As the disease progresses, the adduction of the thighs becomes excessive, and the legs fold across each other like a pair of scissors. Sometimes the spasm is paraplegic, and again it extends to the trunk and upper limbs (spasmodic diplegia). The upper limbs are often affected by athetoid movements, so that double athetosis has sometimes been confounded with Little's disease. The muscles of the velum palati may be involved, causing the noisy sniffling so frequently observed. Sensation is intact, and nutrition normal; there is no emaciation, no atrophy. Bladder and rectum are normal in the performance of their functions. Mental activity may be unimpaired, but in many cases the children are backward, dull of comprehension, learn to talk late or do not talk at all, or may be idiotic. As the contracture progresses the child becomes bed-ridden. The duration of the disease is long, and recovery is doubtful.

Diagnosis.

When the spasmodic rigidity is limited to the lower limbs it is easily recognized, the only diseases with which it might be confounded being chronic myelitis, which, however, is characterized by flaccidity, and hysteria, which does not occur at the same age. In the paraplegia of Pott's disease there are the gibbosity and vesical and intestinal disorders. In the amyotrophic lateral sclerosis of Charcot there is muscular atrophy. Friedreich's disease is accompanied by nystagmus, motor incoördination, and abolition of the reflexes. Multiple sclerosis has some similar symptoms (rigidity, spasm, exaggeration of the reflexes), and some special points of its own (nystagmus, slow and precise articulation). In double athetosis there are contortions, and peculiar movements of the hands when voluntary motions are attempted, but there may also be spasmodic rigidity, and we may have the mixed form: athetosis of the upper limbs with spasmodic rigidity of the lower limbs.

Treatment.

Erb recommends the continuous electric current. The spasms are to be overcome by prolonged tepid baths, passive movements, Swedish gymnastics, massage, antipyrin, and bromide of potassium. The little patients are capable of improvement and training.

Friedreich's Disease (Hereditary Ataxia).

Friedreich (Heidelberg, 1861) described a form of hereditary and family ataxia whose only point in common with the ataxia of adults is the motor incoördination.

Etiology.

It is not rare to see several cases in the same family, the girls being more often attacked than the boys. Eustace Smith observed six cases in one family, Rook saw four children who were all affected as they approached eleven years of age. The disease, as a rule, begins in later childhood, that is towards seven, eight, nine, or ten years. Nervous heredity may be considered in the etiology, but not syphilis.

Pathological Anatomy.

The lesions are found upon the posterior columns of the spinal cord, but instead of being limited to the external radicular zones as in ordinary tabes, the disease spreads to the column of Goll, to

Burdach's column, and to Clark's column. According to Dejerine and Letulle, the sclerosis is not vascular as in locomotor ataxia, but neuralgic, like that described by Chaslin in epilepsy. Under the microscope we see fibrillæ arranged in whirls which have insinuated themselves between the nerve filaments, while the blood-vessels are free. This gliosis implies an hereditary malformation of the external layer of the blastoderm, while vascular sclerosis is derived from the middle layer. This theory has been opposed by Marie.

The arrest in development is not limited to the cord, but may affect other organs. Friedreich has seen a neuritis of the hypoglossal nerve which led to incoördination of the tongue. Nystagmus and difficulty in speech lead to a suspicion of a bulbar lesion; pain and muscular atrophy indicate a peripheral neuritis.

Symptoms.

After a poorly marked and insidious prodromal period, the ataxia appears as the first symptom of prominence; the child is awkward, is unable to maintain his equilibrium, especially in the dark, and often falls. His head oscillates, his speech is slow and precise. The tendon reflexes and muscle sense are abolished, but sensation is preserved. The reactions to electricity are normal, and there are no trophic disturbances. The course of the disease is intermediate between that of tabes and affections of the brain; the children totter and stumble, but do not hit their heels on the ground, nor throw their legs violently about (course of cerebellar tabes of Charcot). The feet are in the position of equinovarus and this position must be regarded as one of the special symptoms of Friedreich's disease. When the child is erect, if he lift one leg, he cannot hold himself up on the other (static ataxia). Nystagmus is often present, and a deviation of the spinal column (kyphosis, scoliosis). The children are poorly developed and remain small, keeping an infantile appearance for a long time. Mentality is preserved, but sometimes lessened. The duration of the disease is indefinite, and the prognosis grave because of its incurability.

Diagnosis.

Friedreich's disease may be distinguished from precocious and juvenile ataxia by the athetoid movements during rest, by the equinus, the kyphoscoliosis, nystagmus, and by the absence of sensory and bulbar disorders, arthropathies, optic neuritis, etc. We have already pointed out the differential diagnosis from Little's disease.

Treatment.

Revulsive treatment should be applied along the whole length of the spinal column (hot iron, blisters). Electricity, massage, and douches are to be applied. Nitrate of silver in pill form (1 to 5 cgm. —gr. $\frac{1}{6}$ to $\frac{5}{6}$) should be tried.

Infantile Paralysis (Acute Anterior Poliomyelitis).

Atrophic infantile paralysis is an acute myelitis of the anterior cornua of the spinal cord, characterized by rapid atrophy of certain groups of muscles. It was partly perceived by Underwood (1784), described by Rilliet under the name of essential paralysis, by Duchenne as fatty atrophic paralysis, by Laborde, by Cornil, who observed the anterior myelitis, by Vulpian and Prévost, who localized the process in the anterior cornua, and finally by Charcot, Joffroy, Roger and Damaschino, who completed the anatomical description. According to Charcot, the myelitis affects the motor cells of the anterior cornua at once, but Roger and Damaschino hold that the inflammatory process starts in the vessels and neuroglia.

Etiology.

This myelitis is seen in the first, second, and third year, being rare after four years and exceptional in adults. It may, however, after a long latent period, appear in adult life in the form of subacute or chronic poliomyelitis (relapse after prolonged interval), and we may even see an old infantile paralysis resulting in adult life in progressive muscular atrophy (Brissaud[61]).

Cold, traumatism, and infectious diseases in especial (measles, scarlatina, typhoid fever) have been considered as causative agents. It would appear that the myelitis is in many cases merely the localization of a general infectious process. Epidemics of the disease have been reported. Cordier[62] in a village of fourteen hundred or fifteen hundred inhabitants, saw thirteen cases of infantile paralysis, four of which ended fatally, and he believes it to be contagious. Medin, of Stockholm, cites similar occurrences, and so also does Macphail.[63] Joffroy lays stress upon a nervous heredity as predisposing to the disease and influencing the spot where the morbid agent (microbe or poison) shall lodge. The cause of the disease may be slight, but the congenital debility of the spinal cord is important.

Pathological Anatomy.

Cornil certainly had observed a diminution in size of the antero-lateral columns of the cord, but to Prévost and Vulpian, Roger and Damaschino belongs the credit of having made a special study of the lesions of the gray substance. They found areas of myelitis with red softening (distention of capillaries, proliferation of the nuclei of the neuroglia and the vascular sheaths, swelling of the motor cells, atrophy of pigment). The atrophy of the cells which Roger and Damaschino consider to be secondary to the areas of myelitis Charcot and Joffroy look upon as primary. As a rule the lesions are unilateral and found in the lumbar enlargement of the cord. The nerves degenerate, and the muscles (Dejerine) become atrophied and diminished in size, and are sometimes the seat of fatty infiltration (Duchenne). The fat may be in sufficient amount to mask the atrophy. In the long run the bones are affected, the bony tissue becomes thinner and the marrow increased in amount; the limbs are arrested in their development.

Symptoms.

At the onset there is fever which is often so slight as to cause doubt as to its presence; convulsions, ill-defined pains, arthralgia, and formication have been noted. Following this stage we have inertia and a general paralysis, which later gradually disappears, to fix itself upon certain muscles. Then we have the flaccid paralysis of one leg or arm, with abolition of the reflexes, preservation of sensation, and vesical and rectal functions (sphincters unaffected), without eschars or trophic disturbances. The lower limbs are more often paralyzed than the upper; we rarely have hemiplegia or crossed paralysis. A single muscle or single group of muscles may be affected (anterior muscles of the leg, or muscles of the calf). This limitation of action is perceived only after the lapse of a few weeks, the child limping, dragging the leg, and refusing to walk. The articulations are unaffected. In the beginning the contractility to electricity is diminished or abolished; should it persist in certain paralyzed muscles, we may indulge the hope that these will not atrophy. Muscles which do not react to faradization have an exaggerated reaction to galvanism (reaction of degeneration). Later, the paralyzed limbs may become cold, purple, livid, and moist. Sometimes ulcers or eschars accompany this local asphyxia. The atrophy is not perceptible before a month or sometimes six months; the muscles are soft, flaccid, and emaciated, the limb is thinner than its mate. The atrophy of cer-

tain muscles and the ill-balanced action of their antagonists result in vicious attitudes, as clubfoot (equinovarus, rather than valgus or talus). There may be abnormal mobility of the articulations (flail-joint). To compensate for these defective attitudes of the limbs, the spinal column may be in lordosis or kyphosis. In a few cases (Henoch) facial paralysis accompanies the paralysis of the limb; but as a rule the cranial nerves are exempt, infantile paralysis not being a cerebral disorder. The prognosis is always grave, for the lesions are incurable; even if death be not an inevitable consequence the infirmity remains as long as life.

Diagnosis.

Infantile paralysis is to be distinguished from the *syphilitic paralysis* of Parrot, which is a disease with an osseous lesion of the newly born; from *obstetrical paralysis*, which affects the brachial plexus; from *cerebral paralyses*, which are hemiplegic and non-atrophic; from *progressive muscular atrophy*, which has a chronic course; from *diphtheritic paralysis*, which is temporary; from Pott's disease, rachitis, etc.

Treatment.

At the onset there should be energetic local revulsion the whole length of the spinal cord (hot iron, cups, vesicatories) and calomel or other purgative given. Later we give strychnine (1 to 5 mgm. a day—gr. $\frac{1}{60}$ to $\frac{1}{12}$), and apply the continuous electric current (positive pole on the vertebra, negative on the limb), or the faradic current to the atrophied muscles. Many applications will have to be made in order to obtain any results. We should not omit friction of the skin, massage, salt baths, Swedish gymnastics, not to mention orthopedic measures.

Muscular Atrophy.

Progressive muscular atrophy due to a chronic and progressive lesion of the anterior cornua of the spinal cord is sometimes met with in childhood (Duchenne[64]). Landouzy and Dejerine[65] have shown that in some cases there is no myelitis but merely an atrophic myopathy.

Etiology.

Progressive muscular atrophy of the Aran-Duchenne type is rare in childhood, but is often an hereditary and familial affection. In the report of Duchenne's (of Boulogne) observations we read of a grandfather who died of atrophy, his son becoming atrophic at forty-eight

years, a grandson and granddaughter at five years. In myelopathic as in myopathic atrophy several members of the same family may be affected by the disease at the same time. We may also note the association of atrophy with pseudohypertrophy in the same person, or in members of the same family.

Pathological Anatomy.

Duchenne at first thought (1849) that the disease was a myopathy, but, Cruveilhier having noted the atrophy of the anterior cornua (1853) and Hayem that of the cells of these cornua, he abandoned this theory. It is very certain that in the adult the anterior cornua are diseased, but in the cases of juvenile atrophy reported by Erb and Dejerine there was no medullary lesion, and all that was found was atrophy of the muscle fibres with fatty degeneration, and sometimes lipomatosis.

Symptoms.

In primary muscular atrophy of the Duchenne type the affection begins in the face; towards the age of five or six years a change is noticed—it is impossible to close the eyelids (orbicular atrophy), the lips lose their mobility, hang down, and remain open, and when the child laughs, talks, or cries give a truly grotesque appearance. The child cannot blow, whistle, or pronounce the labials. The orbicularis oris, elevator muscles, and muscles of the alæ nasi do not react to electricity. The atrophy finally reaches the trunk and limbs, and the child may die from asphyxia due to atrophy of the inspiratory muscles. Atrophy destroys the affected muscles partially, irregularly, and successively. As a rule, the muscles of the hand and thenar and hypothenar eminences are unimpaired. The disease is essentially a chronic one. This is the Duchenne type which Landouzy and Dejerine call the facio-scapulo-humeral type. Erb adds the scapulo-humeral type of childhood, in which the atrophy begins in the shoulders and arms (pectoralis, trapezius, latissimus dorsi, serratus magnus, rhomboideus, flexors of the arm, supinator longus, biceps). The emaciation of the arm is in contrast with the prominence of the deltoid and the muscles of the forearm. There are no fibrillary contractions, nor any reaction of degeneration. Charcot held that this juvenile form was the same as pseudohypertrophic paralysis. Finally, Leyden has described an hereditary atrophy which begins in the lower limbs. We should, in making our diagnosis, bear these various types in mind. The prognosis is always grave.

Treatment.

Electricity and massage are applicable in all cases; iodide of potassium and mercury should be tried, as they sometimes give good results.

Pseudohypertrophic Paralysis.

Pseudohypertrophic paralysis, which was thoroughly investigated by Duchenne,[66] is a *primary myopathy*, characterized by the exaggerated development of certain groups in contrast to their paralysis.

Etiology.

This disease, which is more frequent in boys than in girls, has a marked familial character, and we may see several brothers simultaneously or successively attacked by it. Its complex hereditary connections are due to a nervous diathesis, and myopathic children may be born of atrophic, paralytic, or consanguineous parents (Buss). The onset is early; out of 80 cases Eulenburg noted 45 between one and five years of age, 22 between six and ten, 8 between eleven and sixteen, and only 6 after sixteen years. In this list the number of boys was four times greater than that of the girls.

Pathological Anatomy.

According to researches made by Cohnheim, Charcot, Joffroy, Cornil, and Brault the spinal cord and the nerves are unaffected. In Cornil's case—a child whose brother was myopathic and had been seen by Duchenne in 1868—death occurred thirteen years after the onset of the disease; the deltoids, biceps, muscles of the thighs and calves were enormous, fatty, colorless, and semitransparent. Their fibres were rarefied, thin, and still striated, and surrounded by an abundant cellulo-adipose tissue. In the areas most affected the striated fibres formed scarcely one-tenth to one-fifteenth of the muscle, the rest being taken up by the cellulo-adipose tissue. There must then have been a substitution of this tissue for the muscle tissue without invasion of the remaining muscular fibres by the fat. Duchenne, of Boulogne, has mentioned sclerosis (myosclerotic paralysis), but Cornil did not find it in his case.

Symptoms.

The first thing to be noticed is the impotence of the lower limbs; the child becomes easily tired, spreads his feet apart, walks badly, and leans his body back (lordosis). Later, the pseudohypertrophy

appears, the calves enlarge and become as hard as wood, the thighs, buttocks, shoulders, and arms then becoming affected; there may be atrophy of the upper limbs at the same time as hypertrophy of the calves (Charcot). There are transition forms between pseudohypertrophic paralysis and juvenile muscular atrophy of the Erb or Dejerine type. In some cases the buttocks, the extensor cruri quadriceps, are first affected by the hypertrophy. The disease may extend to the face and the tongue (Weir Mitchell). It is often limited to the calves, and always leaves the anteroexternal muscles of the leg, the pectoral, the rhomboid, and the cervical muscles unaffected. The hypertrophy reaches its maximum in about a year and a half or two years, then the paralysis progresses, prevents walking, and extends to the upper limbs. If the child lies down, he can rise only by placing his hands on his thighs and clambering up with difficulty. In the recumbent position the lordosis disappears. When erect the child has to balance himself to maintain his equilibrium, swings himself about, and walks on his toes like the digitigrada; there is pes equinovarus, flatfoot, or pes cavus.

The electrical contractility is diminished, sensation is intact. The course of the disease is progressive to a fatal termination. Towards the age of fifteen or twenty death occurs from the progress of the affection or from some complicating cause.

Diagnosis.

There is little difficulty about the diagnosis unless the muscles are not prominent, or only slightly so.

Treatment.

Duchenne thought that faradization, applied from the very beginning of the disease, had a curative effect; but this method, like so many others (douches, massage), is of only temporary benefit.

Thomsen's Disease (Myotonia Congenita).

In 1876 Thomsen[67] described a disease characterized by spasms at the beginning of voluntary movements, accompanied by an exaggerated development of the muscular tissue, a diminution of strength, and psychical disorders. Erb, Strümpell, Westphal, Raymond, and Déléage also made researches into this curious affection.

Etiology.

The disease is of an hereditary and familial type, attacking boys more frequently than girls. The family history will show that the progenitors were affected with the same disease or with some form of neurosis, such as epilepsy, migraine, insanity, etc. Erb observed one family in which four generations were affected. It appears in early life; out of forty-six cases thirty-three occurred in infancy, eleven in later childhood, two at twenty and twenty-four years. Among occasional causes have been mentioned fright, onanism, and overfatigue; all moral emotions cause an exaggeration of the symptoms.

Pathological Anatomy.

Erb, Raymond, and Déléage found an increase in the number of the nuclei of the muscle fibres, with an increase of protoplasm and the formation of vacuoles. In a transverse section it was seen that the thickened fibrillæ reached from .070 to .150 mm.; some of them were jagged, eroded, dissociated, or destroyed by granular substance which did not react well to carmine but was stained by Brunswick brown—a protoplasmic substance. The persistence of an embryonic condition of the muscles explains their weakness, which is in contrast with their hypertrophy. Thomsen's disease is therefore a parenchymatous myopathy, the pseudohypertrophic paralysis being an interstitial myopathy—a myosclerosis (Duchenne).

Symptoms.

At the beginning of any voluntary movement, a stiffness, a sort of spasm appears which interferes with the movements, but ceases if they be persisted in. The patient can walk, but only under the condition that he does not stop or change his step. The spasm lasts a few seconds or a minute; it is painless and most marked in the thighs. It may go on to tetanization and cause the patient to fall down. The upper limbs are awkward in prehension and grasping of objects. The spasm is weakened by warmth and rest, increased by movement, cold, and emotion. The exaggerated size of the muscles is noteworthy; a child of fourteen years (Erb) seemed really herculean. Partial atrophies coexist with the hypertrophy. The muscles are harder than normal; sensation is intact, the reflexes are unaffected, the sphincters unimpaired; there are mental disturbances. Erb lays stress upon the myotonic reaction to electricity; the faradic and galvanic excitability of the nerves is normal, that of the muscles in-

creased; reaction to stimulation by mechanical means is also increased. Galvanization of the muscles gives torpid and tonic closure contractions of somewhat prolonged duration. Thomsen's disease is not fatal, but it lasts for an indefinite period, and is almost incurable.

Diagnosis.

This affection has much in common with pseudohypertrophic paralysis; there is the same increase in size of the muscles, the same athletic appearance of the patients, and sometimes the same hollowness of the lumbar region. But in pseudohypertrophic paralysis there is a distinctive vacillating walk, the paralysis is noticeable and is unaccompanied by the spasms at the beginning of voluntary movements which characterize Thomsen's disease, and which prevent its being confounded with other myopathies.

Treatment.

No treatment has ever given permanent results; we should attempt to train the movements, should give massage, friction, baths, douches, and electricity.

Facial Paralysis.

Paralysis of the seventh pair (facial nerve) may be incomplete, and limited to the inferior branches (central origin) or complete (peripheric origin).

Etiology.

In the newly born there is a facial paralysis which is called obstetrical because it is the result of compression by the forceps; it is single or double according to whether one or both nerves have been compressed at their point of emergence. Facial paralysis from intrapelvic compression (sacral promontory, tumor) is extremely rare. In nursing infants and in children over seven years of age facial paralysis may occur spontaneously as the result of cold or of some lesion of the petrous portion of the temporal bone (otitis, caries). It may be of hysterical origin.

Pathological Anatomy.

In paralysis of the newly born, Parrot and Troisier have observed that the peripheric end of the nerve undergoes Wallerian degeneration; while the upper extremity remained normal, the other was softened, gelatinous, grayish, the myelin being replaced by droplets

of fat. In two children who died at the ages of twenty-seven and thirty days the myelin was reabsorbed, and several of Schwann's sheaths were empty. In a child who died on the twelfth day of life the fragments of myelin were still recognizable, and there was no axis cylinder; the muscles of the face were wasted and atrophied. When the lesions reach this stage the paralysis may become incurable, as in a case reported by Duchenne.

Symptoms.

As soon as the child is born, we observe asymmetry of the face when it cries; the mouth is drawn to the healthy side, the eyelids of the affected side are incompletely closed, the nostril is less dilated and less movable. The tongue and the uvula are not deviated, the forceps not having compressed the nerves supplying these organs. The paralysis may be even less complete, a few bifurcating branches only being involved. Should the upper branch alone have been injured, the mouth will remain normal, but it will not be possible to close the eye; the conditions are reversed when it is the lower branch which is affected. In some cases the forceps leave no visible trace, while in others there will be a contusion, a wound, or an ecchymosis. Faradic contractility is abolished, sensation is intact. Little by little the paralysis disappears and the child recovers. The deviation of the features may persist for weeks and months, and forms an obstacle to suction. In paralysis from caries of the petrous portion of the temporal bone, the nerve is destroyed and a cure is impossible. In paralysis *a frigore* and in hysteria, recovery is the rule.

Diagnosis.

The diagnosis is unmistakable, still one must be careful to distinguish between the peripheric paralysis which is complete, and the central paralysis which leaves the superior facial unaffected.

Treatment.

Electricity should be applied daily to the affected muscles; friction and massage should also be given. If the child be unable to nurse, it must be fed by pouring milk in its mouth, until the paralysis shall have disappeared.

Paralysis of the Brachial Plexus.

The brachial plexus may be injured by compression and traction at the time of labor, causing radicular paralysis (paralysis of one or more of the roots of a plexus of nerves) of one or both of the upper

limbs. Duchenne, of Boulogne, was the first to thoroughly investigate this paralysis, which he described in his work,[64] and was followed by Nadaud,[68] Erb (1874), Roulland,[69] Comby,[70] and others.

Etiology.

This paralysis may be met with after natural labor, without version or forceps (Jacquemier, Polaillon), but is then very slight and of short duration. More frequently it is the result of pressure by the forceps (Smellie, Guéniot, Blot, Depaul), or of traction in breech presentation, or sometimes in presentation of the vertex (Duchenne). In version, tractions and compression of the brachial plexus often occur. Should there be spontaneous paralysis from too great size of the shoulders of the fœtus, the clavicles are pushed towards each other, and the fifth and sixth cervical nerves are compressed at Erb's point. In case of injury from forceps, the brachial plexus may be directly compressed by the blades of the instrument. If we introduce a curved finger or a hook for the purpose of disengaging the shoulders, the clavicle, which is pushed upwards, may compress the nerves. Coils of the umbilical cord may also produce compression. Finally, lifting of the shoulders, traction of the arms, and the placing of curved fingers upon the back of the neck may all compress the plexus.

Pathological Anatomy.

As the disease is not a fatal one, we rarely have any occasion to verify the diagnosis by an autopsy. In one case, however (eschar caused by the forceps near the external border of the trapezius), the child died at the end of eight days, and blood was found around the brachial plexus, the nerves being injected.

Symptoms.

The paralysis may be double, but is usually single; the child's arm falls helplessly by his side; sensation is preserved, contractility to faradism preserved or abolished according to the severity of the case. When it is abolished, recovery is doubtful. As a rule, the paralysis gradually diminishes, and is cured in eight, ten, or fifteen days; some patients do not recover freedom of motion under several months, others remain paralyzed, and their muscles become atrophied. Duchenne remarked the fact that the paralysis affected certain muscles, leaving others undisturbed, the affected ones being the deltoid, infraspinous, biceps, and brachialis anticus. The limb hangs down, and is pressed against the thorax in interior rotation,

the forearm is extended, the hand *en griffe* and in pronation with flexed fingers. According to Erb, radicular paralysis is due to a lesion of the nerves of the brachial plexus near the scaleni, at a point situated 2 or 3 cm. (about an inch) above the clavicle outside the posterior border of the sternomastoid, near the anterior tubercle of the transverse process of the sixth cervical vertebra (Erb's point). Stimulation of this point will cause simultaneous contraction of the deltoid, biceps, coracobrachialis, and supinators. In some cases the paralysis is complete and bilateral, sensation even being abolished. We sometimes see fascicular paralysis due to the compression of isolated nerve bundles, far removed from their point of emergence at the spinal column.

Prognosis.

The prognosis varies; a cure is the rule, but it is not invariable, as in some cases the children remain paralyzed with atrophy of one or both arms.

Diagnosis.

These cases suggest infantile paralysis, but the beginning is different. Syphilitic paralysis is distinguished by coëxisting lesions of the bones, by the stigmata, and by the results of specific treatment. True radicular paralyses must be distinguished from the false paralyses which accompany obstetrical fractures and luxations of the humerus.

Treatment.

At a very early stage of the disease we must apply electricity to the paralyzed muscles; faradization, the continuous current at from ten to twenty milliampères, the positive pole above Erb's point, the negative pole upon the paralyzed muscles. Massage, friction, and salt baths are useful.

Torticollis.

Etiology.

This affection is more frequent during later childhood than in infancy, and is especially observed in the rheumatic and the nervous; it is often due to cold. It may characterize the invasion of severe fevers (Rilliet and Barthez), grippe, and malaria; it may accompany angina, vertebral arthritis, and rachitis. In any case it may be acute or subacute. When chronic, it may take on a familial type; Dieffenbach has observed left-sided torticollis in five brothers and sisters.

Guyon found fifteen cases of congenital torticollis out of sixty-four. Obstetrical traumatism, the forceps, powerful traction, and hæmatoma of the sternomastoid have frequently been noted as causes. The latter, however, may exist without torticollis or muscular contraction. In children who are of the nervous type the torticollis may be the result of a defective position, or of a strabismus; it may follow convulsions, or it may appear suddenly after overexertion (spasmodic torticollis).

Pathological Anatomy.

Whenever an autopsy has been possible, the muscle has been found to be sclerosed throughout a portion of its extent, shortened, and emaciated; the blood-vessels may have undergone atrophy, the mastoid process may be lengthened, and the clavicle bent. The subjacent bones are rarely affected. The sternal portion of the muscle is more diseased than the clavicular portion.

Symptoms.

In the acute form the attack comes on suddenly after a walk, overfatigue, or overstraining, with pain, sometimes with fever, with insomnia, and sweating; or the torticollis may first appear in the morning upon awakening. The head is inclined to the affected side, with the chin turned in the opposite direction; the neck is stiff and immovable; should any attempt be made to straighten it the child will scream. A hard mass may be felt which is caused by the projection of the sternomastoid. At the end of from eight to fifteen days the contracture yields, and the torticollis is cured. It may, however, become chronic; in this case the bending of the head becomes exaggerated, the ear tending to approach the shoulder which in its turn is elevated. A compensatory curvature is seen in the dorsocervical part of the vertebral column. In the long run the cranium and the face undergo atrophy upon the affected side (Jules Guérin) and strabismus appears (Cuignet). Bouvier states that the external carotid is atrophied. In short, the whole of the affected side feels the influence of the impairment of the circulation and of nutrition. In addition to the constant torticollis there may be contraction of the cutaneous muscles of the neck, of the trapezius, and of the muscles of the nape.

The *prognosis* varies according to the form of the disease, being good in acute cases, grave in the chronic ones.

Diagnosis.

Torticollis is recognizable at sight, but we must ascertain the cause; whether it be due to a lesion of the muscle, to cold, rheumatism, or a neurosis. We must, above all, make sure that it does not conceal a suboccipital Pott's disease, a tuberculous adenopathy, a cold abscess, or a tumor.

Treatment.

In the acute cases we should try massage, electricity, friction, blisters; if rheumatism be suspected, we must administer sodium salicylate; jaborandi has given good results in some cases. In the chronic form Dupuytren (1882) and Dieffenbach performed tenotomy —this must be followed by the wearing of a "Minerva" collar. Morgan (1861) obtained success from resection of the spinal accessory nerve; stretching of the nerve succeeded once out of two attempts.

Zona.

Zona or herpes zoster is a special neuritis manifested by groups of vesicles arranged along the course of the nerves. This affection has been considered infectious (zosterian fever of Landouzy).

Etiology.

Zona, rare in both childhood and adult life, seems to be more frequent in the spring and summer than in winter. It attacks girls more often than boys (twenty-one girls to twelve boys in my statistics). It may occur during the first year of life; I have seen it at eight months, but it occurs more frequently towards the tenth year. Cold, traumatism, vaccination, an acute disease, an intoxication, or tuberculosis may precede the zona. I have found a nervous taint in several children, and atonic dyspepsia in others. The contagiousness of zona has not been demonstrated, yet Millon saw two children of the same family attacked by it, the one after the other. Zona is the manifestation of a neuritis which may be infectious, but which may also be traumatic, or come from some other and quite different cause.

In view of the fact that the disposition of the vesicles is not always confined to the course of the nerves upon which they start, several authorities (Brissaud, Achard) have supposed that the spinal cord, rather than the nerves, was the seat of the disease.

Pathological Anatomy.

In 1863 Bärensprung described, in zona, a lesion of the spinal ganglia. In a child twenty months old, who was tuberculous, and died six weeks after the onset of a right thoracic zona, the ganglia of the sixth, seventh, and eighth intercostal nerves were injected, swollen, and inflamed, the inflammation reaching to the peripheric nerves. In 1865 Charcot and Cotard found the same lesion in a cancerous woman. Since then the neuritis has been clearly demonstrated by Lesser, Kaposi, Pitres and Vaillard, Dubler, Leudet, etc. Out of eighteen autopsies, the spinal ganglia or Gasser's ganglion were found to be diseased fifteen times, healthy three times; the neuritis was never absent.

Symptoms.

At the onset we frequently find a little fever with anorexia and digestive disturbances; but these prodromes may be very slight and quite escape observation. The general reaction is feeble or absent, and the local reaction much weakened in the child; there is a slight pruritus at the point of eruption, no notable or persistent neuralgic pains—a painless zona. Infantile zona causes no suffering, the disease being limited to the appearance of the red plaques upon which are situated the herpetiform vesicles. The groups of vesicles are arranged in a semicircle about the trunk, in longitudinal bands upon the limbs, and in fan shape upon the face (ophthalmic zona).

As a rule, the zona is seen around the thorax, next upon the limbs, and last of all upon the face. Ophthalmic zona is the most dangerous form of the disease, because of the ocular lesions, the keratitis which it may occasion.

The vesicles are at first clear and transparent, but gradually become turbid and even hemorrhagic; by fusion they may give rise to phlyctenulæ. The complications which have been noticed are lymphangitis, adenitis, cutaneous eschars, and gangrene.

Out of 33 cases in my own practice I have observed zona 19 times on the left side, 14 times on the right, 16 times on the thorax, 8 times on the limbs, 4 times on the abdomen, 5 times on the face and the neck. Twice I saw a conjunctivitis on the same side as the zona.

Prognosis.

This is good in the child. The pain is slight.

Diagnosis.

The situation of the eruption, its acute onset, and its rapid course decide the diagnosis. When on the face, however, we may be inclined to think it the simple herpes which appears around the mouth and which may spread to the cheeks, the chin, and the ears; we must note the fever which in this case is usually very marked, and the frequent relapses. Zona does not have relapses.

Treatment.

As there is disorder of the gastric function, we must purge the child with calomel; he should be kept in bed, and the diseased surfaces must be protected with an antiseptic powder and a dressing of wadding, in order to avoid scratching. Recovery will be speedy.

ORGANS OF SPECIAL SENSE.

Ophthalmia.

Ophthalmia must be divided into two classes, according as it occurs in the newly born or in older children.

Ophthalmia of the Newly Born.

Under this name I have in mind especially the purulent conjunctivitis which occurs in the first days and weeks of life.

Etiology.—The child is usually inoculated during its passage through the vagina and the vulva, but it may also be contaminated after birth, in crèches, foundling asylums, maternities, etc., where other children who are already diseased come in contact with the healthy infants. Conjunctivitis of the newly born is not always due to gonococci; while it is often the result of a more or less pronounced gonorrhœa of the mother, it may also be the result of simple catarrh, of leucorrhœa, whence the legitimate distinction between simple catarrhal conjunctivitis from some simple cause (streptococcus, staphylococcus) and blennorrhagic conjunctivitis (gonococcus). Diphtheria may sometimes be the cause, which gives us a third variety of ophthalmia neonatorum. Debilitated children born before term are especially liable to the disease.

Symptoms.—Clinically we have two varieties, the light and the severe. The first, occurring later than the second, on the seventh, eighth, or tenth day, has the characters of a simple inflammation with redness of the conjunctiva, muco-pus between the eyelids, and little or no swelling. This form is easily cured by a few irrigations,

but if neglected may be prolonged and aggravated. The second form, or conjunctival blennorrhagia, becomes manifest upon the second or third day; it becomes purulent upon the second day, the swollen lids are unable to open, and when they are forced apart a flow of pus appears; unless there is prompt interference, the cornea may be attacked, ulcerated, and perforated, and the eye may be completely destroyed. Many children become one-eyed or blind as the result of ophthalmia.

Treatment and Prophylaxis.—If the disease is slight, irrigations of a two or three per cent. boric-acid solution every two or three hours, according to the case, will suffice for a cure. In serious cases, however, we must force open the eyelids and cauterize the mucous membrane with a 1:100 or a 1:50 solution of nitrate of silver, being careful to neutralize with salt water immediately after the application of the caustic.

By way of prevention, there should be careful vaginal antisepsis of pregnant women, at least in the last month of pregnancy, and especially during labor. For this purpose we use a 1:2,000 or a 1:4,000 solution of bichloride; a boiled borated solution may serve the purpose. As soon as the child is born its eyes should be washed with absorbent cotton saturated with a boric-acid solution, and a drop of the 1:50 solution of silver nitrate should be introduced between the eyelids (Credé's method), or a few drops of lemon juice (Pinard). Valude prefers insufflations of iodoform, and Budin recommends the instillation of a 1:150 solution of silver nitrate. In maternities and foundling asylums, infants suffering from ophthalmia should be isolated in order to protect the others. In many countries the attempt has been made to limit the propagation of ophthalmia by means of the law. In France a legal act of November 30th, 1892, renders it obligatory for midwives and physicians to report ophthalmia neonatorum. Any midwife who finds ophthalmia in a newly-born child at whose birth she has officiated must call in a physician, instead of increasing the trouble by the foolish treatment so often adopted (milk poured into the eyes, etc.).

Ophthalmia of Later Childhood.

Nursing infants and older children may, like the newly born, become affected with purulent ophthalmia from contagion. Little girls affected with vaginitis or vulvovaginitis have been known to contaminate themselves or their companions; and nurses and physicians have contracted ophthalmia by caring for those affected with the disease. But the disease is an extremely rare one in any but the newly born, and there only remains for us to study the acute or chronic

ophthalmias of later childhood, which are independent of the gonococcus.

Acute Ophthalmia without Gonococci.—The action of cold, of foreign bodies, of the dust of the air, or of irritating vapors (ammonia, etc.) may cause a more or less severe inflammation of the conjunctiva, with intense redness and a secretion of muco-pus which agglutinates the eyelids together. The child complains of a sensation as of sand, a pricking or heat. In the beginning of measles, of grippe, and of the eruptive fevers in general there is an ophthalmia of this nature. Another form of the disease found frequently among schoolboys, and deserving of the name of *school ophthalmia*, consists of an acute, intense catarrhal conjunctivitis, with redness and swelling of the mucous membrane, a mucopurulent secretion, pricking sensations, and sometimes photophobia. This ophthalmia is contagious, and is propagated to children in the same family or school. It is due to the Weeks bacillus. In spite of its intensity and its acute symptoms it is not serious, and may be cured in seven or eight days by means of washings with boracic-acid solutions, instillations of 1:100 solutions of zinc sulphate, inunctions with an ointment of the yellow oxide of mercury (vaseline 10 gm. [2½ dr.], yellow oxide of mercury 25 cgm. [4 gr.]).

We often meet with an acute phlyctenular or vesicular conjunctivitis which is merely the localization upon the eye of impetigo contagiosa, and which is due to the staphylococcus. The ocular conjunctiva then presents one or two rounded projections, about the size of a millet seed, with peripheric congestion, lacrymation, and photophobia. Should the vesicles invade the cornea, they may cause a keratitis and leave an opacity in their wake. Varicella has been known to cause such a vesicular keratoconjunctivitis. These ophthalmias are to be treated by sulphate-of-zinc solution, 1:100, or yellow precipitate ointment, 1:40; and if the cornea is affected, we may add night and morning one drop of a collyrium of atropine, 1:500.

Chronic Ophthalmia.—Blepharoconjunctivitis and chronic keratitis are very common in later childhood. They sometimes follow acute inflammations, and are frequently seen as a result of measles. Lymphatic, scrofulous, and eczematous children are predisposed to the affection. These chronic ophthalmias are often caused or kept up by lesions of the nasal fossæ, chronic coryzas which by extension through the lacrymal canal infect the eye. In addition to scrofula or tuberculosis which predisposes to keratoconjunctivitis, there is hereditary syphilis, which leaves opacities upon the cornea that are often permanent (interstitial keratitis). Glandulociliary blepharitis

of a chronic type is often the expression, the localization upon the eyelids of a chronic eczema, and is sometimes accompanied by granulations of the palpebral mucous membrane. The lashes are often affected and fall off. This form of the disease is very rebellious to treatment. Lesions of the cornea (ulcers, thickening, leucoma, staphyloma) are serious, for they compromise the sight.

Treatment should be both general and local. The first has for its aim the purification of the blood and the strengthening of the child, and should consist in the administration of cod-liver oil, iodide of iron, and iodide of potassium, with good feeding and proper hygiene. The local treatment consists in reëstablishing the permeability of the lacrymal passages when they are obstructed, and in asepsis of the eye by washing with tepid boric-acid solutions, collyria, insufflations of calomel, and mercurial ointments. When there is keratitis, collyria of atropine (1:300 or 500) will be useful, and if there be an ulcer of the cornea we can use eserine (same dose).

Otitis.

There are two varieties of otitis—those without and those within the membrana tympani.

Otitis Externa.

External otitis is fairly common among infants; a small dermic abscess, a sort of furuncle, projects into the external auditory canal, incompletely closing it, and finally opens, giving out pus. During the formation of this abscess the child suffers, is feverish, cries, and refuses the breast. Unless one examines the ear it is easy to overlook the cause of the trouble. When the abscess has formed and projects into the meatus, it must be opened with the point of the bistoury which will shorten the sufferings of the child. In older children abscess of the ear may be caused by a foreign body accidentally introduced, as a pebble, a pea, a bead, etc. Some difficulty may be experienced in extracting these foreign bodies which children have such a mania for poking into themselves, and the manœuvres necessary for their removal as well as the uncleanliness of the objects themselves may cause inflammation of the canal. Martha has pointed out a rare and little known cause of external otitis in the newly born. When the infant lies on its side in the cradle, any vomited matter or regurgitated milk may run into the external auditory canal. This milk ferments, irritates the external ear, and causes the flow of a clear but very odorous pus. Otitis from milk is not of a serious nature. Every kind of external otitis must be carefully treated by anti-

septic washings (tepid solutions of boric acid with one-tenth part of Van Swieten's fluid) and by powdering with salol or aristol. Of course the absurd practice of pouring milk into the ear to allay inflammation will not be resorted to; it is a notion of ignorant nurses and matrons which the physician can hardly be expected to indorse. In short, cleanliness and antisepsis are the only true methods for the cure of external otitis.

Otitis Media.

Otitis media, which is much more serious than the preceding form, is extremely common.

Etiology.—Foreign bodies, plugs of cerumen, eczematous or impetiginous eruptions may, after having irritated the external auditory canal, force their way through the tympanic membrane and invade the tympanum itself. But otitis media most frequently is the result of an inflammatory or infective process which has penetrated through the Eustachian tube. Lesions of the throat or of the posterior portion of the nasal fossæ are easily propagated to the tube and to the middle ear. Acute, subacute, and chronic anginas, adenoid growths, nasopharyngeal catarrhs, or even a simple coryza may all become complicated by otitis media. In the infectious diseases, such as measles, typhoid fever, grippe, mumps, and whooping-cough, the middle ear is greatly exposed to secondary infection, and the flow of purulent matter after these diseases is well known. At first acute, otitis media may pass on to a chronic state. In the acute form various microbes have been found, whose agency has been determined by Netter.[71] At least four kinds can be distinguished: (1) Otitis with streptococci; (2) otitis with pneumococci; (3) otitis with Friedländer's bacillus; (4) otitis with staphylococci. In the chronic forms of otitis, which are often fetid, the microbes of putrefaction are found, and sometimes Koch's bacillus. Otitis, whether primary or secondary, unilateral or bilateral, is most frequently accompanied by the streptococcus. The otitis with pneumococci is either primary or secondary to pneumonia or to grippe (Zaufal). The otitis with Friedländer's bacillus and that with staphylococci are rare forms. All these microbes penetrate into the tympanum by the Eustachian tube, they come from the throat and come into play when their virulence has been stimulated by the disease. It is quite exceptional for otitis media to be infected through the blood or lymph channels.

Symptoms.—The onset is often insidious, and the flow appears without having been preceded by either pain or fever. In some cases, however, the child may complain of a very severe otalgia which precedes the otorrhœa by one, two, or three days, ceasing

when the tympanum is perforated. In nervous and excitable children the pain may cause convulsions. With the pain there may be vertigo, humming, and whistling. The flow is at first bloody, but later it becomes seropurulent or purulent, and may be fluid or thick, odorless at the onset and fetid later. It varies as to color, amount, and duration according to the case. Transitory in grippe, it is durable in anginas; in pertussis it is often preceded or accompanied by otorrhagia. The otitis with pneumococci is of shorter duration than that with streptococci, the longest of all being the otitis of tuberculosis. The otorrhœa in this case is subject to relapses and repetitions which render it interminable; the suppuration lasts for years and ends by destroying the auditory organs; it often leads to deafness; and when this deafness is bilateral and occurs in the first years of life, it causes dumbness as well. Otitis media may be complicated by mastoiditis with suppuration of the mastoid cells, subcutaneous abscess, and fistula; it may lead to cerebral abscess, to meningitis, phlebitis of the sinuses, or pyohæmia. It may end by destroying the facial nerve in its course through the petrous portion (facial paralysis). The prognosis, therefore, in neglected cases is grave.

Treatment.—We must try to prevent otitis media by antisepsis of the mouth, throat, and nasal fossæ (irrigation, washing, insufflations, gargles, topical applications). Should the pain be atrocious and the fever high, we shall have to open the membrana tympani. To stop the flow, we must give free irrigation of the auditory canal with borated solution, and apply antiseptic powders (boric acid, salol, dermatol, aristol, etc.). In cases of mastoiditis we must open the mastoid process in order to wash out the tympanum and the cavities communicating with it.

DISEASES OF THE SKIN.

As dermatology it treated of elsewhere in this work, I shall content myself with a mere abstract of diseases of the skin in children. Some of the affections which I shall mention are not, properly speaking, dermatoses at all, but as they did not properly belong in any of the other sections, I have thought it best to consider them here.

Œdema of the Newly Born.

Œdema of the newly born, formed by a serous infiltration of the subcutaneous cellular tissue, was discovered by Underwood at the end of the last century, and has been studied by Billard (1828), Depaul, Parrot, and others.

Etiology.

Œdema of the newly born, which is sometimes congenital and seen in premature infants, and sometimes appears after birth, is a disease of feeble, delicate, cachectic, and hereditarily syphilitic children. It is met with more often in winter than in summer, in cold rather than in warm climates, among the poor rather than among the rich, in maternities and asylums rather than in private practice. Billard, in 1826, out of 5,392 children in the Hospice des Enfants-Assistés, found 240 cases of œdema, 50 of which resulted in death. The children were from one to eight days old. There were more cases in the winter than in the summer months. Heyfelder, by means of heat and hygienic measures, was able to reduce by one-third the proportion of cases of œdema of the newly born.

How is this lesion to be explained? Dumas considers it due to venous thrombosis, and thinks it the same as phlegmasia alba dolens. Other authorities believe that there is a malformation of the heart or blood-vessels. In one case I saw œdema of the upper limb accompany obstetrical radicular paralysis. According to Billard, it is a simple œdema, and symptomatic of some obstacle to the circulation in the heart, lungs, or large vessels.

Pathological Anatomy.

The skin is soft; upon section a bloody, coagulable serous fluid oozes out; there is often atelectasis of the lungs, the sinuses of the dura mater are thrombosed, the heart is dilated, and we may find hydropericardium, hydrothorax, ascites, and enteritis. Ballantyne[72] reports a case associated with nephritis.

Symptoms.

In the first few days after birth œdema appears in the calves of the legs, on the postero-internal surface of the thighs, in the scrotum or labia majora, on the hands and the feet. It is rarely generalized, but is found in dependent portions of the body. The œdema is soft and keeps the impress of the finger, but the skin may be hard and tense. The child is inert, torpid, and cold, the heart beats feebly and slowly, and vitality is much diminished. Athrepsia often accompanies the œdema, which may also be complicated by icterus, bronchopneumonia, œdematous laryngitis, and fatal coma. If the œdema is partial, and the hygienic conditions are satisfactory, a cure is possible. Valleix places the onset between the first and fifth day of life, but œdema may be met with later; I saw a case in a bottle-fed

baby three months old. The older the child the less dangerous the disease. The prognosis is bad in hospitals and maternities, but relatively favorable in families if the child nurses and is carefully tended.

Treatment.

Heat and food are the two chief requisites. Billard advised wrapping the child in hot flannel, together with frictions with camphorated alcohol, and bleeding to combat the atelectasis of the lungs and weakness of the heart. A few drops of alcohol may be given by the mouth or by subcutaneous injections, inhalation of oxygen should be administered, and the child placed in a couveuse at from 28° to 30° (82.4° to 86° F.); gavage should be resorted to. Hot mustard baths, frictions with hot oil, and massage with hot flannel are also useful procedures.

Sclerema of the New-Born.

Sclerema, which was for a long time confounded with œdema, differs from it by the hardening of the skin, which causes the limbs to lose their mobility, and transforms the integument into an inflexible armor.

Etiology.

Parrot considers the disease to be due to athrepsia, but the latter is common while the former is rare. As in the case of œdema, sclerema is found in prematurely born, in debilitated and ill-nourished children, and in those exposed to cold. More than this is not known in regard to the etiology.

Pathological Anatomy.

The skin is not swollen and soft, as in œdema, but dry, hard, sclerosed and thin. Upon section there is no oozing of fluid. Under the skin, the connective tissue shows thick bands which constrict the fat, causing it to atrophy and become reabsorbed. The vessels are diminished. Yet there is not a true sclerosis as in scleroderma, a disease which is rare in childhood (Brocq and Veillon[73]). Congestive lesions are found in the viscera (lungs, brain, liver, and spleen).

Symptoms.

Sclerema of the newly born appears later than œdema, on the seventh, eighth, or tenth day; it is often, if not always, preceded by athrepsia. Parrot stated that it began below in the lower limbs,

rising to the dorsolumbar region, with a tendency to become general, but cases have been seen in which it began on the face. The skin is tense and adheres to the deeper parts as though the body had been frozen; it is immovable, incapable of gliding, and of a livid color. Motion is interfered with, the limbs remaining in extension, and the articulations being unable to bend; the child may be lifted in one stiff mass. When the face is involved, the mouth is immovably fixed in a sort of rictus which makes nursing impossible. In connection with sclerema we may find thrush, diarrhœa, and erythema of the buttocks. The body is cold, the pulse weak, and death may follow convulsions, coma, or a final pneumonia. The prognosis is most grave; œdema is often cured, but sclerema scarcely ever. Valleix and Billard make a special point of the death agony, comparing it to cadaveric rigidity.

Treatment.

As in œdema, we should apply heat to the parts, give stimulating friction and massage, feed the child well, try gavage, etc.

Congenital Myxœdema.

Myxœdema, pachydermic cachexia, sporadic cretinism, is doubtless not a skin disease, since it is a general condition dependent upon the absence or atrophy of the thyroid gland. But the swelling of the integument and its œdematous aspect justify us in considering the disease in connection with œdema and sclerema of the newly born. The appearance given by myxœdema is one never to be forgotten; the head is covered with sparse and dry hair, there is relative alopecia of the vertex; the nose is sunken, the cheeks and lips are swollen and hanging, the mouth is open with protrusion of a swollen tongue, the whole face is large and rounded like a full moon; the skin is brown in color, the abdomen enlarged, with projection of the umbilicus; there is pseudolipoma at the base of the neck; the fontanelle is widely open. Development is retarded, the child is smaller than others of his age, he cannot walk, he has few or no teeth, he does not speak nor understand, and is in every way backward. The central temperature is lowered, the extremities are cold. There is a constipated habit. Although often congenital, it does not manifest itself at once; the child is normal for the first months, and then from about the fifth or sixth months ceases to make any progress, undergoes a change of complexion, becomes puffy and inert. Palpation of the neck shows absence of the thyroid body. With this group of symptoms to guide us, it will be easy to distinguish myxœdema from anasarca, con-

genital elephantiasis, fibroma molluscum, congenital hypertrophy, etc. Treatment is efficacious; engrafting of the thyroid body was first attempted, then injection of the thyroid juice, but the present practice consists in ingestion of the thyroid gland of the sheep, either in its natural form, in glycerin extract, or in tablets.

Nævi and Angiomata.

Nævi are congenital pigmentary or vascular spots. They are of several forms and degrees. 1st. Non-vascular or pigmentary nævi. Some are smooth, nævus spilus, and occur in the form of spots which may be light brown, or black, or very dark in color, with a smooth surface; others are hairy and smooth at the same time, nævus pilosus; others again are prominent and warty, nævus verrucosus, the skin being thickened, wrinkled, bristling with projections and with thick, stiff hairs; some are true sessile or pedunculated tumors, nævus hypertrophicus, lipomatodes, mollusciform. 2d. Vascular nævi, angiomata, congenital telangiectasis. Here again we find nævi which are smooth, plane-like, or erectile spots, wine stains, fire stains, nævus flammeus. Some are punctate, others accompanied by rays which give them a stellate appearance. Finally these vascular nævi may form a tumor—these are the elevated nævi (fungus hæmatodes, erectile tumor of Dupuytren, cavernous angioma of Virchow). These nævi may take on the appearance of fruits, such as strawberries or raspberries. They may be subcutaneous, profound, or visceral. Deep and even pulsating angiomata coexist with pigmentary nævi, papillomata, and molluscum pendulum. Two-thirds of these growths are found upon the head. Nævi are formed by the dilatation and neoformation of capillaries during fœtal life; the birth marks, nævi materni, are the result of a constitutional formative aberration (Besnier). They may at the time of birth be so minute as to escape notice and, developing with the growth of the child, give rise to the idea that they are acquired, while in reality they are congenital. For a few years they exhibit a great tendency to growth, and then they may retrocede. Some go on increasing, spreading out upon the surface, and extending deeply, forming large, knotty, compressible tumors (elephantiasis-like angioma). The prognosis is grave in this case; but the flat nævi, the port-wine stains are of little importance. According to Parker, girls are more often affected than boys (three hundred and sixty-five girls out of five hundred and four cases). Depaul believes that one-third of the children who come into the world have nævi.

The *treatment* will vary according to the form; for simple spots,

vaccination, cauterization, or linear scarifications will usually suffice; for erectile tumors, prolonged compression may be tried if the tumor is situated upon resistant tissues; to attempt destruction of the growth by the use of chemical caustics is a dangerous procedure. Lannelongue obtained some good results by the interstitial injection of chloride of zinc. The best treatment of all is electricity; in some cases extirpation is called for.

Congenital Elephantiasis.

This disease, which is of frequent occurrence in tropical countries, is characteried by the enormous hypertrophy of some limb or part of a limb. Moncorvo, of Rio de Janeiro, has reported several cases in the last few years, two among whites, three among half-breeds, one in a negro child. In one case both feet were affected, in one the right foot, in one the two legs, in one the left leg, in one the trunk and the right arm. R. Sara[74] once noted a case of elephantiasis in Italy in which the disease began in the right foot and then extended to the leg. Another case in which the left leg was affected, in a girl baby five days old, has been reported by Archambaud.[75]

In these cases a limb, usually one of the lower ones, becomes of colossal size, which is in direct contrast with the relative slenderness of the other; the skin is uneven, rough, and marked with elevations and depressions; it is hard and tense, instead of being soft as in œdema. Moncorvo found the streptococcus in the blood, and he believes that elephantiasis is allied to lymphangitis. Other observers have met with the filaria sanguinis hominis, and consider the disease as a manifestation of filariasis, while some think it the result of hereditary syphilis. It would seem that the lymphatic system is especially affected, and that elephantiasis is the result of a lymphatic thrombosis. In the way of treatment, we must try electricity, compression by the elastic bandage, and iodide of potassium.

Congenital Hypertrophy.

This disease, which is very rare and very imperfectly understood as to its causes and course, consists in the exaggerated and asymmetrical development of some part of the body. It is usually unilateral, but may be situated upon either the right or the left side alone. When partial and limited to one limb, it may resemble elephantiasis, but we may note that the skin is smooth and supple, and normal in every way except that of size. There are cases in which the hypertrophy is false, there being a diffuse angioma of one limb,

or a lymphangioma analogous to that of elephantiasis. Even here close observation of the shape of the limb, its proportions, and the pliability of the tissues will settle the question of diagnosis. In true hypertrophy all the parts are developed in an exaggerated manner—the skin, cellular tissue, muscles, and bones. The child has no longer any symmetry, any corporeal harmony, although it may apparently be in excellent health.

Congenital Amputations; Ainhum.

Although we group together congenital amputations and ainhum, they are really quite different in their origin and nature. Ainhum is an acquired disease, peculiar to the negro race, very slow in its mutilating action, and slightly resembling scleroderma and leprosy. Spontaneous amputations, on the contrary, are congenital; they are found at birth, and are due to intrauterine compression by the umbilical cord, or by amniotic bridles—these causes acting mechanically, without the intervention of any mysterious agency, trophic disturbance, or the like.

Eustache[76] saw, in a newly born child weighing 3 kgm. ($7\frac{1}{5}$ lbs.) the three middle toes of the left foot fused together and amputated from their terminal phalanx; on the second toe, above a circular furrow which was continued on to the stumps of the other toes, was a hemispherical projection which on the third day became detached by the action upon its pedunculated base of a thin, shining membranous thread. This thread had amputated the third and fourth toes, and was completing the amputation of the second. In all other respects the child was in good health. We may conclude that the umbilical cord sometimes, and amniotic bridles frequently tighten around and strangle certain parts of the fœtus, finally causing their amputation. The bridle does not result from the furrow of amputation, but is the cause of it. Congenital amputation is not of internal, fœtal origin, but is external and usually amniotic. Lhomme[77] also believes that congenital amputations are not malformations, but mutilations which may be more or less complete, sometimes being merely indicated.

Erythemas.

The class of erythemas, so important in pediatrics, is characterized by a more or less diffused redness of the skin, sometimes dry, sometimes moist, vesicular, bullous, etc. There are several varieties.

Simple Erythema.

Simple erythema (which is very common in infants, especially in such as are ill-nourished, who suffer from diarrhœa, constipation, and various digestive disorders) is situated on the buttocks, thighs, and anogenital regions. From these points of origin it may spread to the legs, feet, trunk, or may even become general. It is especially marked at all the natural furrows, such as the folds of skin of the thighs, the axillæ, the neck (intertrigo). In these situations it readily becomes of an oozing type, and is complicated by erosions, crevices, and ulcerations which may become very severe. The cause of infantile erythemas is a duplex one, and consists in first, a local influence, cutaneous irritation by the fæces, urine, or sweat, the friction of opposing surfaces, a lack of cleanliness, etc.; second, general influences, such as diet, or an autointoxication. At the onset we see small red or rose-colored, round or lenticular spots, which disappear under pressure of the fingers, and which by uniting together may form extensive plaques. They are often followed by a slight desquamation. It is rare for an erythema to remain dry, and it is nearly always accompanied by a certain amount of maceration of the epidermis, by exfoliation, erosions, and fissures of greater or less severity. Vesicles and even bullæ may be seen; the exposed dermis becomes inflamed and covered with papular projections, causing a papular erythema which may simulate syphilitic papules. The erythema may be complicated by eczematous lesions, by pustules of ecthyma, by subcutaneous abscesses, and sometimes by eschars of the buttocks and heels. These lesions are especially apt to occur during athrepsia. In some cases the erythema is of great extent, and is accompanied by a scarlatiniform desquamation which entirely removes the skin from the buttocks, thighs, and loins. The appearance is as if the child had been covered with collodion.

Erythema as a rule is preceded and accompanied by diarrhœa, vomiting, constipation, emaciation, and athrepsia. On the other hand, some of the patients are plump and well in appearance. Simple erythema may be easily recognized by the form of the lesions, by their situation, and by their color. But when an erythematous patch of the buttocks and anal region is soiled and irritated by the urine and the fæces, it becomes deformed and papular, and may then be easily mistaken for the mucous patches of syphilis. But in the latter disease the erythema is accompanied by coryza and labial patches. Although in itself not a grave disease, erythema of the newly born should not be neglected, for it is the expression of a defective condition of nutrition, and it may become complicated by cutaneous infections.

Treatment consists in the first place of regulation of the general hygienic conditions and the child's digestion (sterilized milk, or a good wet-nurse, alkalies, a well-regulated diet, etc.), in the second place of careful antiseptic dressing of the affected parts. Instead of many baths and washings we should use dry dressings, consisting of absorbent and antiseptic powders (lycopodium, starch, boric acid, talc).

Sudoral Erythema and Miliaria Rubra.

On account of the delicacy of their skin, young children are more exposed than adults to the miliary eruptions with a red base due to heat and perspiration, which are preëminently seasonal. They are most marked upon the forehead, neck, chest, and abdomen. They are chiefly found in children who drink much fluid, who are too warmly dressed, and who are exposed to heat. The miliary eruption is always preceded by abundant sweating; the skin becomes reddened in spots, and is covered with small acuminated vesicles which dry very rapidly and give rise to a furfuraceous desquamation. Miliaria is found in the eruptive fevers, especially in scarlatina, where it forms a whitish eruption which desquamates early. We must distinguish this miliaria rubra from sudamina, the lesions of which are colorless and crystalline, never becoming turbid, which desquamate quickly, are unaccompanied by erythema, and are chiefly observed during convalescence from acute febrile affections, typhoid fever, pneumonia, grippe, etc. The eruption of sudamina is noted more often in typhoid than in any other fever, and I have demonstrated the fact that to it was due the more or less extensive desquamation which follows this disease.[78] Among the eruptions due to sweating, I must not fail to mention the dysidrosis of Tilbury Fox, which is situated between the fingers, and is accompanied by pruritus. The epidermis is uplifted by a clear fluid, as in miliaria, but there are no isolated, superficial vesicles as in miliaria and sudamina. The skin is leather-like. In two cases of this nature no fluid followed pricking of the lesion. All these eruptions should be treated in the simplest fashion, by dusting with starch or lycopodium, diminishing the amount of fluid ingested, and dressing the child lightly to avoid perspiration.

Erythema Nodosum and Polymorphous Erythema.

Erythema nodosum, dermatitis contusiformis, is characterized by dermic or subdermic nodules surmounted by red spots, which little by little undergo all the discolorations of bloody effusions, and leave ecchymoses similar to those produced by contusions. It is rare in the first years of life, although I have seen it as early as the

twelfth or fourteenth month, and is observed chiefly between the ages of five and ten. Its course is that of an eruptive fever, although less severe. It used to be supposed that it was dependent upon rheumatism, because of the arthralgias which often accompany it. Boicesco and Moncorvo have described a form of infantile malarial nodular erythema, but it is a question whether these cases were not mere coincidences. The disease rarely relapses. In one case Para noted that it was contagious in children of the same family. Nearly all dermatologists admit the relationship between erythema nodosum and polymorphous erythema. Yet there are some differences to be observed between the two: erythema nodosum is situated on the legs, more rarely on the thighs and arms. It is characterized by discrete nodules which appear successively and gradually disappear, leaving ecchymoses behind; these nodules doubtless may become flattened, diffused, extend over large surfaces, and become transformed into papules; some of the transition forms seem to connect erythema nodosum and polymorphous erythema. But the latter is situated upon the hands, wrists, neck, and face; it is papular, vesicular, and bullous rather than nodular.

The *indurated erythema* of young girls described by Bazin is situated on the calves; it is a lymphaticostrumous lesion, of prolonged duration, which is cured by rest and compression. The symptoms of erythema nodosum are both general and local. At the onset there is often fever and some gastric disorder, with malaise, anorexia, fatigue, and pallor of the face. Then, upon the anterior surface of the legs we find several red, hard, hot nodules, which are painful on pressure. The shape and size of these nodules vary; they may be small or large, globular or flat; some are like walnuts embedded in the dermis, others are in the form of patches with indefinite outlines. Pressure is painful on the first day, but not after that. The induration disappears, the erythema vanishes, and then the ecchymotic spots are seen. The fever, except in cases complicated by endocarditis, pericarditis, pleurisy, or pulmonary congestion, is slight and transitory. During convalescence a certain amount of anæmia and weakness persists. In children the prognosis is very good.

We must distinguish erythema nodosum from ephemeral *rheumatic nodules*, which are unaccompanied by redness; from *urticaria tuberosa*, which has not the same situation, and is accompanied by pruritus; from *scrofulotuberculous* and *syphilitic gummata*, which are of longer duration, more indurated at the beginning and softer later. The treatment consists of rest in bed, a milk diet, a mild purgative, and soothing ointments. We may also give quinine and the iodide of potassium.

Erythema Pernio or Chilblain.

In many children cold causes the appearance of red, projecting, burning, and itching patches usually situated upon the extremities, the hands, the feet, the ears, and nose—in other words, upon those portions of the body which are the farthest from the circulatory centres. These patches, which are called chilblains, persist for weeks and months, sometimes lasting all winter. They disappear with the warm weather. They are very common in older childhood, in schoolboys and college boys, especially if they are tender, lymphatic, scrofulous, or arthritic. School life with its sedentary habits, its defective hygiene, and its alternations of cold and heat predisposes to the affection.

Upon the dorsal surface of the hands and feet we see several flat, red or purple elevations; the surrounding skin is cold and cyanosed, sometimes cracked and fissured and covered with phlyctenulæ. They resemble nothing so much as burns of the first and second degree. In some cases there are veritable eschars, suggesting symmetrical gangrene of the extremities, or Maurice Raymond's disease. When the child goes from the cold into the heat, the itching becomes intolerable; the nights are especially painful. During the course of the winter the disease presents remissions and exacerbations. The hands and feet are swollen and awkward in their movements; both walking and prehension are interfered with. Complications may appear, such as lymphangitis, adenophlegmon, bleeding fissures, ulcers, or eschars.

We must distinguish chilblains from *spina ventosa* or tuberculosis of the phalanges and metacarpal bones, which causes swelling; from *lupus erythematosus*, which is permanent and does not undergo any change with the change of seasons.

Treatment must be both hygienic and medicinal; the children must be protected from the cold by warm clothing, exercise, and motion; if they are lymphatic, they should be made to take cod-liver oil and preparations of iodine; their hands should be washed in tepid water, in decoctions of walnut leaves, in diluted camphorated alcohol. If the chilblains are not ulcerated, we may add to these lotions frequent applications of the tincture of iodine. Any ulceration or wound of the integument is to be treated like a burn, with boric or salol vaseline, oxide-of-zinc plaster, or 1:100 picric-acid lotions.

Affections of the Sudoriferous and Sebaceous Glands.

Hyperidrosis.

Hyperidrosis means an exaggerated secretion of sweat; if it is general and due to heat or to the ingestion of fluids, it is of no medical interest. The important cases are those in which the hyperidrosis is limited to the extremities (hands, feet), and is entirely uninfluenced by food or the external temperature. It has often occurred to me to see little girls with a nervous, hysterical taint, whose hands were affected with a troublesome hyperidrosis, the skin being cyanotic and purple. This idiopathic hyperidrosis, not due to any special cause, called also ephidrosis, is a nervous symptom of some importance. It may be temporary, relapsing, or permanent. Odorless on the hands, it may be fetid on the feet, and form a most distressing malady. We must endeavor to reduce the sweating by belladonna and atropine, agaricus albus, the phosphate of lime, tannin, ergotin, and digitalis. We must favor diuresis and free movement of the intestines, and act upon the skin by hot frictions, lotions of camphorated alcohol, or cologne water. The perspiration can be dried by antiseptic and absorbent powders, such as starch and salicylic acid. When there is fetor (bromidrosis) we must prescribe frequent foot-baths with naphtholated water, or a solution of bichloride, 1:1,000.

Chromidrosis.

By this name we designate sweat which is colored red, blue, yellow, green, etc. It is a rare affection of hysterical nature. Chabbert[79] has reported three cases of yellow chromidrosis in three members of the same family who were neurasthenic and hysterical. The oldest of six children, who was twelve years of age, nervous, degenerate, the subject of convulsions (hysterical mother), in July, 1893, found his shirt stained yellow; a few weeks later, the 24th of August, he had an attack of hysterical convulsions. In such cases treatment should be general, and consist of cold hydrotherapy—douches, lotions, and massage.

Sudamina.

By sudamina we mean small superficial vesicles which are absolutely transparent, and are sometimes visible only by oblique rays of light. They cause no itching and no cutaneous reaction, and are often unperceived. These lesions, which are especially abundant wherever the skin is the thinnest, as the neck, the chest, and the

abdomen, are of various sizes—sometimes so small as to be scarcely visible, sometimes from coalescence large and resembling phlyctenulæ. They last but a short time, disappearing in a day and leaving a furfuraceous desquamation. The vesicles when pricked give out a clear fluid, which I have always found of neutral reaction to litmus paper. Sudamina, which are very common in children of all ages, are found especially at the end of acute febrile diseases—such as typhoid, pneumonia, grippe, rheumatism, erysipelas, etc. By itself the disease has no special importance.

Acne, Comedones, Furuncles.

Acne, which is more frequent in adults, may, however, be also observed in later childhood. It is a lesion of the sebaceous glands, and consists of several varieties:

1. *Non-inflammatory acne*, milium, comedone. *Acne punctata*, or comedone, is characterized by small acuminated lesions, the apex of which has a black or brown spot, corresponding to the orifice of the sebaceous gland. Pressure at the base of the pimple will push out a worm-like filament, which is the mold of the sebaceous gland (comedone), and which often contains a parasite called the *acarus folliculorum*, or *demodex follicularum*. This form of acne is situated on the forehead, nose, chin, temples, and cheeks. It may be arranged in symmetrical groups on each side of the forehead, on the eyebrows, temples, and sides of the cheeks (comedone of childhood; Colcott Fox, Radcliffe Crocker). It usually appears at puberty.

2. *Miliary acne, milium* (strophulus albidus of Willan) occurs in the form of small, whitish, rounded, superficial grains, of pinhead size, due to the retention of sebum in the sebaceous follicles. They are seen on the eyelids, cheeks, temples, and palatine arch; they are of common occurrence in the newly born.

3. *Acne rosacea*, "*couperose*," which is rare in childhood, is situated upon the nose and cheeks; in young girls it occurs in the form of red or violet spots, of greater or less extent, and of varying shade.

4. *Acne pustulosa, phlegmonous acne*, is noticed on the face, the back, and the front of the chest in large lymphatic or scrofulous children. It often leaves white, depressed cicatrices, similar to those of smallpox; it is contagious and autoinoculable.

The *treatment* of the different forms of acne, with the exception of acne of the newly born, is both general and local; the digestive system must be put in good working order by a wholesome dietary, and by forbidding alcohol, spices, sea and shell fish, "high" meat, strong cheese, cabbage and cauliflower, and fats in excess. Consti-

pation must be overcome, and intestinal antisepsis attended to. If the children are scrofulous, they should be given cod-liver oil and arsenic (La Bourboule); if they are arthritic, alkalies are to be prescribed; if anæmic, iron and sulphates. Locally, good results are obtained by the use of hot boric and alcohol lotions, by sulphur lotions, Gowland's lotion diluted (1:2,000), or soft soap.

Herpes.

Herpes, which is of common occurrence at all ages, is characterized by small, epidermic, vesicular elevations, which are arranged in groups, and after desiccation leave more or less thick crusts. They are found on the skin and on the mucous membranes, and especially on the face. The affection is sometimes primary and isolated, sometimes symptomatic of an acute disease (pneumonia, angina, cerebrospinal meningitis). I shall limit my description to primary herpes. It is usually labial or facial, and is as a rule preceded by fever (herpetic fever); it may coexist with herpes of the throat or of the mouth (herpetic angina and stomatitis). It develops rapidly, in four, five, or six days, and leaves no cicatrices. While possibly an infectious disease or an autointoxication, herpes may be due to cold, to fatigue, or to excessive eating. It easily returns, and some children seem to develop it upon the slightest pretext. It differs from impetigo by the small size and the groupings of the lesions. But when dry and in crusts it is difficult to distinguish them apart.

Simple herpes must not be confounded with zona (herpes zoster), which is a special form of neuritis; nor with the herpetiform dermatitis of Duhring, which has a very different course.

Under the name of hydroa of childhood, or infantile relapsing herpetiform dermatitis, Unna has described a form of Duhring's dermatitis which begins in the first years of life, which presents frequent relapses, especially during the summer, which disappears in adult life, and which seems to consist of a mixture of papular erythema, vesicles, non-pustular bullæ, etc.

The *treatment* of herpes is very simple, and consists in protecting the affected parts against scratching and contact with anything of an irritating nature; this we can accomplish by anointing the parts with borated vaseline or some other unguent. If there is fever or any gastric trouble, we should administer a laxative and put the child upon a milk diet.

Pemphigus; Bullous Fever.

Pemphigus is a bullous dermatosis which occurs either in successive attacks in later childhood (chronic pemphigus, pemphigus foliaceus, herpetiform dermatitis of Duhring), in the form of phlyctenulæ upon the hands and feet (syphilitic pemphigus), or in the form of small, medium, or large bullæ of rapid development in the newly born and nursing infants. Pemphigus of the newly born, also called bullous fever, is the most interesting variety; it is observed in the first few days of life in an epidemic form (maternities), or later in sporadic form. I have met with it at all ages, in the first days, the first months, at two, three, ten, and fifteen years. In one case it seemed to me to have been carried by the midwife. The contagiousness of the disease has been observed by Koch, Palmer, Mettenheimer, and Salvage. Hervieux, however, out of one hundred and fifty cases has not seen one case of contagion. Vidal successfully inoculated one of his pupils with pemphigus of a new-born infant; the bulla appeared four days after the inoculation. With the same lapse of time, Colrat has obtained positive results from inoculation. A bacterium (Vidal and Dejerine) and a micrococcus (Colrat) have been described. Strelitz has also noted the presence of a micrococcus, and Almquist had a successful result from the inoculation of a coccus resembling the staphylococcus aureus. Pemphigus may be accompanied by fever, which is almost excessive, or it may be almost apyretic. Bullæ filled with a clear fluid and resting upon a reddened surface are seen here and there, upon the neck, thorax, buttocks, and limbs, some of them being as small as the vesicles of smallpox, and some as large as walnuts. The limpid contents soon become turbid, the bulla bursts, the epidermis wrinkles and shrivels, forming scales and crusts, which fall off and leave red and mammillated spots. The number of bullæ is very variable; they are discrete in some cases, innumerable in others. Bullous fever is of short duration, not much lengthened by the succession of attacks which may take place; usually on the tenth, fifteenth, or twentieth day recovery or death occurs. Antiseptic and occluding dressings may prevent extension of the bullæ and shorten the disease.

The prognosis varies according to the case. Some forms are benign, and some grave. In my own practice I lost two children in less than eight days. Behrend has had five deaths, Palmer several, Zechmeister six out of twenty-eight cases. We must distinguish between primary and *syphilitic pemphigus;* the latter is situated upon the hands and feet, which the former never invades; the phlyctenulæ have

a dirty look; there is bleeding and denudation of the dermis. *Varicella* has smaller bullæ which are disseminated over the whole body, but in some cases (*varicella bullosa*) there are pemphigoid lesions which are perplexing. *Impetigo* may take on the appearance of pemphigus. The treatment of pemphigus should be an antiseptic one, and consist of bichloride baths (3 to 5 gm. [45 to 75 grs.] to each bath), powdering with a mixture of boric acid, salol, lycopodium, etc. The patients should be isolated.

Dermatitis Exfoliativa of the New-Born.

First described by Ritter (1878–79), who claimed to have seen three hundred cases in ten years in the Foundling Hospital of Prague, then by Behrend, Kaposi, Bohn, Caspary, and Elliot,[80] dermatitis exfoliativa of the newly born is almost unknown in France. It may be that a number of different affections are included under this name, simple or desquamative erythema, physiological desquamation, cutaneous septicæmia, etc. Kaposi considers this disease as the aggravation of the physiological exfoliation of the epidermis in the newly born, as a pyohæmia (Ritter's theory). It somewhat resembles pemphigus foliaceus, with which Behrend confounds it. It begins in the first days or the first two weeks of life. The skin is red at first, and then desquamates in furfuraceous scales, especially on the face and the folds around the joints. The trunk is invaded. Rhagades are seen at the labial commissures, the nostrils, and the eyelids; even the mucous membrane of the mouth may be affected. At the end of from eight to fifteen days the exfoliation ceases. Sometimes the epidermis is uplifted in large patches or bullæ, or it may become cracked and give issue to a serous fluid which dries and leaves a crust. These cases are grave. Riehl, having found a fungus, considers the disease to be a mycosis. In some cases the affection is benign, the general condition remains good, the child develops normally and does not lose weight, while in other cases the disease is complicated by pulmonary or intestinal troubles, abscess, furuncles, gangrene, or the cutaneous septicæmias which have played so important a part in Ritter's mortality (nearly fifty per cent.). His observations, however, were scarcely made under favorable conditions (Foundling Hospital). We must distinguish dermatitis exfoliativa from simple generalized erythema, from extensive erysipelas, from eczema rubrum, and from pemphigus neonatorum. Treatment is antiseptic; bichloride baths, powdering the affected surfaces, and a hygienic diet.

Pruriginous and Toxicodermic Eruptions.

Pruriginous eruptions, such as urticaria, strophulus, and prurigo, are usually a form of toxicodermatitis—in other words, a dermatosis of internal origin, caused by the cutaneous elimination of poisons introduced into or elaborated by the organs, especially by those of the digestive tract.

Urticaria.

Urticaria, which is one of the most common affections, occurs in the form of projecting, red, ephemeral, very pruriginous spots. Contact with certain vegetable growths (nettles) or animals (fleas, bedbugs, mosquitoes) easily causes this eruption in children. As a rule, however, the cause is an internal one, from food, medicine, or some morbid condition. In the majority of cases urticaria is secondary to dyspepsia, and accompanies the abuse of fluid drinks and dilatation of the stomach. If the cause is a temporary one (indigestion) the urticaria lasts but a short time; if permanent, the urticaria may recur and finally pass on to a chronic state. It is sometimes seen after the eruptive fevers (measles, scarlatina). Nervous excitement and scratching cause the appearance and continuation of the eruption. Anatomically urticaria is a circumscribed œdema of the skin (Renaut); there is dilatation of the vessels, transudation of serum, diapedesis of the leucocytes. There are several varieties of the affection.

Acute urticaria is often febrile, lasts a few days only (nettlerash fever), and usually follows a too hearty meal, indigestion, or the ingestion of shell or sea fish. There is great itching, swelling, and redness of the face, sometimes swelling of the buccal mucous membrane and of the tongue (diffuse, œdematous, erysipelatous urticaria), sometimes cough and dyspnœa (urticaria of the bronchi), more frequently vomiting, diarrhœa, and digestive disorders. Sometimes the red patches are topped by vesicles or bullæ (vesicular or bullous urticaria).

Subacute urticaria, with relapses, which occurs in successive and more or less numerous attacks, which lasts several weeks, and is not accompanied by noticeable fever.

Chronic or persistent urticaria, the result of previous and long-continued digestive troubles, following artificial feeding, gastrectasia, the abuse of fluids. The body is covered with the lesions of scratching, with bloody crusts, papules, cracks, and eczematous patches. The eruption finally becomes polymorphous, giving a clinical picture of *lichen agrius* (Devergne) and of Hebra's *prurigo*. Permanent pigmentation of the skin is seen between the papules. The diagnosis

of urticaria is usually easy, yet when there are bullæ we may be led to suspect varicella, and when the lesions are very prominent (giant urticaria), erythema nodosum.

Treatment is first of all hygienic; the food must be selected with care and be easily digestible, little fluid is to be allowed, no stimulants, no undiluted wine, no uncooked food, no shell fish or "high" meats. The patients should be frequently purged, and antisepsis of the intestines should be attended to. As few baths as possible should be taken. We may use lotions of vinegar water, and ointments of the glycerole of starch to which has been added tartaric acid (1:40). In rebellious cases we may put on wrappings of cloths impregnated with cod-liver oil. Wadded wrappings, by preventing scratching, will diminish the duration of urticaria (Jacquet).

Urticaria pigmentosa. Apart from the cutaneous discolorations which follow the scratching of chronic urticaria, Raymond [81] has described a special form characterized by permanent lesions which appear in the first months of life, are at first rose-colored, then dark brown, or *café-au-lait.* The whole body is covered with them. The disease progresses by attacks which are of an invading nature, then it remains stationary; it is not cured without leaving cicatrices. The itching is to be allayed by chloroform water, and the bromhydrate of quinine should be given internally.

Strophulus.

This affection, which has been well described by Bateman and Willan, is a pruriginous dermatosis of earliest infancy, characterized by the formation of small papular or vesicular elevations, which are usually discrete, rounded, or acuminate, in themselves lasting but a short while, but being prolonged by repeated attacks of unlimited number. Vidal described this affection under the name of lichen simplex acutus. It is not a true lichen, there being no real papules of the dermis, but a dermatosis of the nature of urticarial erythema. Very frequent in nursing infants or those who are ill-nourished (bottle-fed, prematurely weaned, etc.), strophulus is rare after the second year. It occurs under the same conditions as urticaria—it is a toxidermatosis originating in the digestive tract. Dentition, contrary to the opinion of some, has really nothing to do with it, but there is usually diarrhœa, constipation, vomiting, dilatation of the stomach—in other words, dyspepsia is an accompaniment.

The eruption of strophulus is usually discrete; on the face, forearm, wrists, and legs we see isolated elevations of a whitish-gray color, at first pruriginous, and then indolent and hard to the touch;

at the beginning they are surrounded by a red circle, they may even be preceded by or intermingled with urticaria. In size and form they resemble a hempseed or a lentil. These pimples are set in the dermis. Scratching tears them and causes them to bleed, which covers their apices with a bloody crust. Strophulus may be vesicular. The duration of each lesion is from eight to ten days, but the successive attacks of the eruption may go on for several months, and we may even witness the transformation of strophulus into Hebra's prurigo, a much to be dreaded ending of the toxidermatoses of childhood. Strophulus may be known from urticaria by the acuminated shape of the lesion, but it may follow the latter affection. In lichen planus, which is rare in childhood, the lesions are flat, more coherent, and more lasting. Eczema occurs in the form of small vesicles grouped together, and succeeding a more or less severe dermatitis.

The treatment is the same as that of urticaria.

Prurigo.

This affection is closely allied to the eruptions just mentioned; urticaria in particular leads to prurigo, and accompanies it throughout its existence. Prurigo may be due to an internal intoxication (digestive disorders), or to external intoxication (scabies, lice, etc.). It is characterized by small rounded papules, excoriated by scratching; they vary much in size and situation. If the prurigo is situated upon the nape of the neck, between the shoulders, or upon the back, it indicates the presence of lice; if upon the hands, in the interdigital spaces, the wrist, feet, and breasts, it indicates scabies. In nervous children we may often find pruritus without prurigo. Sometimes mere scratching is enough to cause the eruption. Should prurigo become chronic, scratching will finally cause fissures, cracks, eczematous dermatitis, and lichen-like formations of the skin, which make of prurigo a polymorphous dermatitis—this is the prurigo of Hebra. Prurigo may be distinguished from urticaria by the small size and the greater persistence of the lesions, from strophulus by the absence of vesicles, from eczema by the absence of sweating and crusts.

The *treatment* will depend upon the cause; if there are parasites, they must be got rid of; if there is dyspepsia it must be treated by the usual means. As in urticaria, we must have recourse to acid inunctions, and cod-liver oil to allay the itching.

Vesicular and Pustular Forms of Dermatitis.

Eczema.

Eczema is an inflammation of the skin, a dermatitis, which is usually covered with small vesico-pustules that open and become dried, giving rise to oozing, to excoriations, desquamations, and more or less thickened crusts. The vesicular phase of eczema is sometimes absent, and we may see eczematous red patches, which dry and desquamate, without any sign of vesiculation. Between typical eczema and sebaceous flux, seborrhœa and pityriasis, there is a whole series of eruptions which make of eczema a complete and multiform dermopathy.

Seborrhœa, in the beginning is not an eczema, but a hypersecretion of the glands of the skin which is characterized by crusts on the scalp of nursing infants, or by small pellicles which fill the hair of older children (pityriasis capitis). Beneath the seborrhœa, however, there may be an inflammation of the skin, a complicating eczema (seborrheal eczema). The seborrhœa of the scalp which is so common among nursing infants who are ill cared for can be prevented and cured by cleanliness.

Eczema may be due to external causes, to negligence, to the irritation of a parasite (pediculosis), or to internal causes (defective diet, dyspepsia). Breast-fed infants may have eczema if their feeding is not properly regulated, if they nurse too much or too often, if the milk of the wet-nurse is too old, too fatty, too heating. Eczema is especially frequent in dyspeptic and rachitic children with intestinal fermentation; in these cases it is the manifestation of a real autointoxication. Dentition plays but a small part, if any. An hereditary taint, whether scrofulous or arthritic, should be carefully sought for. The eczema of the scrofulous is torpid, moist, crusty, impetiginous; it is situated on the head, around the natural orifices (ears, nose, lips, eyelids), and is often complicated by external otitis, rhinitis, blepharoconjunctivitis, adenitis, and cold abscess. The infectious diseases and the eruptive fevers (measles, vaccination, etc.) may give rise to, or aggravate an existing eczema. Under the name of "gourme" we include all the eczemas of infancy. According to Unna, seborrheal eczema is a parasitic affection.

There are many clinical varieties of the disease. 1. Eczema of the head and the face, very frequent in nursing infants, moist and crusty, sometimes forming a most horrible mask, torn by scratching, intermingled with furrows, cracks, and crusts of dried blood. 2. Disseminated and generalized eczema, invading the limbs, the trunk, and the

genitalia. 3. Acute eczema, eczema rubrum, characterized by a diffuse redness of great intensity and by the rapid formation of numerous vesicles. 4. Chronic eczema, which is more or less extensive, indefinitely persistent, dry or moist, sometimes alternating with asthma-like bronchial symptoms. I have seen many children who coughed severely and felt a sense of oppression when the eczema disappeared, who breathed freely again when it reappeared. These metastases, these rebounds of eczema have been observed, not only in the respiratory apparatus, but in the nervous centres (convulsions), kidneys (albuminuria), and digestive tract (diarrhœa and vomiting). Such occurrences as these, while very rare, have a tendency to make one regard infantile eczema as a species of issue which must be left alone or treated with great care. Generalized eczema must be treated gradually, bit by bit, while at the same time we secure antisepsis of the intestines with the greatest care. Eczema is an open door through which microbes may pass; the inflamed skin may be invaded by the staphylococcus (impetiginous eczema), by the streptococcus (lymphangitis, adenitis); we sometimes see pustules of ecthyma; furuncles and abscesses may complicate eczema. When the eczema is situated near the lips it causes infiltration and hypertrophy of these organs.

The *course* and the *prognosis* of eczema vary with the form and the causation. If the disease is due to parasites (impetigo granulata), a cure will be obtained by destroying the pediculi. When it is constitutional it is of interminable duration; but, as a rule, eczema of childhood is less rebellious to treatment than that of adults.

The *diagnosis* is easy; psoriasis has thick, dry, and iridescent scales; impetigo is characterized by pustules which leave thick and yellowish crusts, and it is autoinoculable; miliaria rubra is like eczema, vesicular, but the vesicles are ephemeral; the same is the case with herpes. Erysipelas might be confounded with eczema rubrum; tinea circinata has a rounded, circular form. The eczema-like forms of dermatitis produced by external applications (thapsia, tincture of iodine, mercury) may be recognized by their localization, their sudden appearance, and their rapid course.

The *treatment* of eczema is twofold: the ground or constitution must be modified, and the local condition treated. In especial must the digestive tract be the subject of care, and a rigid diet should be prescribed—no alcoholic drinks, no spiced, fermented, decayed, or raw foods, no cabbage or cauliflower, etc. A few doses may be given of bicarbonate of soda, salicylate of bismuth, magnesia, or benzonaphthol. Locally we should apply inert ointments at first (vaseline, or glycerole of starch to which has been added the oxide

of zinc, or the subnitrate of bismuth, 1:10); if the eczema is torpid, tar or sulphur ointments should be used. Itching may be allayed by inunctions of cod-liver oil; a starch plaster will remove any crusts that may be present. Scrofulous children should be given cod-liver oil internally, together with preparations of iodine; arthritic patients should be put upon alkalies and a vegetable diet.

Impetigo and Ecthyma.

Impetigo is characterized by the formation of superficial pustules which are auto- and heteroinoculable (impetigo contagiosa of Tilbury Fox), which rapidly open and leave yellowish, thick, non-adherent concretions, not followed by cicatrices. The staphylococcus aureus has been found in the pustules of impetigo; Charles Leroux holds that the streptococcus is the primary cause of the disease. The organism finds its way in through some cutaneous irritation, a wound, an insect bite, vaccination, piercing of the ear. Contagion from child to child and the dissemination of the affection over the whole body by autoinoculation, are undeniable facts. *Ecthyma*, a no less contagious disease, microbial like impetigo (staphylococcus), is distinguished from it by the deeper situation of the pustules, and by the inflammatory reaction and induration of the surrounding skin. The pustules of ecthyma, like those of impetigo, are generally disseminated and non-confluent. The favorite situations of impetigo are the face, hands, and all uncovered parts, the covered portions being protected against scratching and inoculation by the fingers. The eruption may become disseminated and general, and may form large patches upon the body. From its primary seat, the skin, impetigo may invade the mucous membranes, the conjunctivæ (phlyctenular conjunctivitis), the nasal fossæ (impetiginous coryza), the vulva (impetiginous vulvitis), the auditory canal (impetiginous otitis), the mouth (impetiginous stomatitis). When impetigo is situated on the terminal phalanx of a finger it constitutes paronychia. It may be seated in many and various places. It may, moreover, be complicated by ecthyma, furuncles, abscess, erysipelas, gangrene, and every possible variety of pyodermatitis; it may also serve as the point of entrance for acute osteomyelitis. We must distinguish impetigo from eczema, which is often difficult, for the two affections may be intermingled and complicate each other; we must look for isolated patches (impetigo larvalis), and if necessary we may make autoinoculations. Ecthyma differs from impetigo by the deep situation of its pustules, by the ulcerations of the dermis, and the persistent cicatrices which it leaves. Pemphigus has large and transparent bullæ; but in some cases impetigo may have a rather puzzling bullous stage (pemphigoid

impetigo). Herpes has small vesicles, arranged in groups containing a greater or less number, but when dried and in crusts it resembles impetigo. The treatment consists of isolation and antisepsis; emollient applications should first be used to remove the crusts, and then at night and morning we should apply ointments of borated vaseline; if there are only a few isolated patches, they may be treated by Vigo's plaster.

Cutaneous Gangrene.

Many forms of cutaneous gangrene often complicate other skin diseases, if the children are feeble, thin, exhausted, or cachectic. They must be related to impetigo, for they are often due to the same pathogenic organism; they are a form of pyodermatitis, manifestations of the action of the cutaneous staphylococcus. Cutaneous gangrene has been observed in the first years of life—at six months, one year, and two years. O. Simon (Breslau, 1878) has accurately described this affection. It may complicate vaccination, varicella (Hutchinson), purpura (Martin de Girard), tuberculosis, impetigo, smallpox, measles, pertussis, eczema, erythema of the newly born, and the wounds left by blisters. In short, it is a secondary lesion which may become engrafted upon any other skin lesion, or occur spontaneously in cachectic children. We first see phlyctenulæ or ecthymatous pustules which break and leave the derma exposed; the surface is black and sphacelated, and there is a circle of inflammation around the eschar; the latter falls and leaves a pit of large or small size. The skin is fairly riddled with these spots of denudation. When they are in great number, the child is feverish and falls into an adynamic and marasmic condition. Death soon follows. The prognosis is very grave, although recovery is possible in some cases.

We must endeavor to strengthen the child by feeding, by tonics, and a little alcohol; above all we must try to sterilize the gangrenous places by bichloride baths (4 to 5 gm. of bichloride of mercury to each bath), by iodoform, aristol, and salol dressings.

Multiple Cutaneous and Subcutaneous Abscesses.

The multiple abscesses of nursing infants are also a form of pyodermatitis closely allied to gangrene, ecthyma, and impetigo. Like these diseases of the skin, they are due to the staphylococcus aureus (Escherich); the pathogenic agent does not come from within but from without, and the abscess is the result of an exogenous cutaneous affection, the microbes penetrating the skin through the glandular orifices. Dissemination is caused by scratching and autoinoculation. The cause of cutaneous abscess is therefore local and super-

ficial. We must not imagine it to be due to a general septicæmia, even when the abscesses are many in number and occur in succession for weeks or months. These collections of pus, which are small, nodular in the beginning and soft later, differ from scrofulotuberculous or syphilitic gummata by their more rapid development, and by the results of bacteriological examination and cultures. In situation and in size they vary greatly; the abscess may be very small, almost miliary, and dermic; or it may be as large as a hazelnut or walnut, and form a large mass beneath the skin. The prognosis is not bad providing that the disease be properly treated. At the onset the skin must be treated antiseptically by means of bichloride baths; then the abscesses must be opened and dressed with iodoform gauze. Covering each abscess with Vigo's plaster would have the effect of preventing autoinoculation.

Keratoses.

Under the name of keratoses we may describe the non-weeping, non-vesicular affections of the epidermis, such as ichthyosis, palmar or plantar keratodermatitis, warts, psoriasis, etc.

Ichthyosis.

This is a malformation of the skin which is usually congenital, although it may not develop until a few months or even a few years after birth. It is characterized by extraordinary dryness (xeroderma), and by the formation of scales which suggest those of fish or reptiles. In the fœtus (ichthyosis fœtalis) the lesions are general, deep, and fatal (Ballantyne[82]). True ichthyosis occurs in infancy only; it is hereditary in families; several brothers and sisters may be affected with it at the same time; it may skip a generation. Besnier recognizes three degrees: (1) Light, furfuraceous ichthyosis, which is the variety occurring in the first months and years of life; (2) moderate ichthyosis, which is iridescent, and scutellate, the skin resembling that of a toad or a snake; it is black from pigmentation and from the deposits of dust, and covered with warty excrescences; (3) severe ichthyosis, hyperkeratosis (sauriosis of Wilson).

The children are pale, thin, and poorly developed, as if the functional cutaneous trouble affected general nutrition. Inversely, in cachectic diseases (chronic diarrhœa, tuberculosis), the general condition causes a xeroderma and ichthyotic appearance of the skin. The epidermis is exuberant, the papillæ are large, and the glands atrophied (hair follicles, sebaceous and sudoriparous glands). The skin, which is dry, rough, dirty, and grayish, constantly sheds epidermal

débris which soils the clothes and bedding. There are several degrees of this lesion; sometimes it is in the form of an impalpable powder, sometimes in large scales or shreds. The desquamation is most marked along the limbs; the scalp may be invaded. Sometimes the scales are in the form of thick, firm deposits (corneous ichthyosis, lichenoid ichthyosis). The nails are dry and easily broken; the hairs are rudimentary and surrounded at their base by elevations of the epidermis, constituting *keratosis pilaris.*

The duration of the disease is indefinite, and ichthyosis is incurable. It is easily recognized at sight and by the touch. It is to be distinguished from psoriasis, the rounded patches of which are isolated, thick, crusty, and iridescent; from dry eczema, which is never generalized; from *pityriasis rubra pilaris*, which is a rare and special affection allied to the *exfoliative dermatitis* of Erasmus Wilson. Ichthyosis is not found upon the palms or soles.

Treatment can be palliative only; the patient's strength must be sustained by a nourishing diet, by cod-liver oil, quinine, etc. The skin is then to be whitened and cleansed by acid ointments, fatty or glycerin inunctions, and emollient baths.

Palmar and Plantar Keratosis.

Palmar and plantar keratodermatitis is characterized by enormous hypertrophy of the epidermis of the palms of the hands and soles of the feet, which causes disfigurement and interferes with both walking and prehension. This disease must be distinguished from *corns, acquired callosities, tyloma, tylosis palmæ et plantæ*, which are circumscribed and moderate thickenings, thinner at the edges than in the middle, obliterating the natural lines, causing a loss of sensibility, etc. These lesions are the result of long-continued accidental pressure (shoes, tools), and may become corneous. Symmetrical keratodermatitis of the extremities, on the other hand, is congenital and hereditary; it may coexist with more or less numerous nævi, and must be distinguished from ichthyosis (Unna, 1883). In the museum of the St. Louis Hospital of Paris we may see a specimen of this affection (No. 961); the mother, three maternal uncles, and two sisters were affected in the same way as the subject, while three brothers were normal. The whole surface of the feet in contact with the ground is corneous, a line of erythema separating the diseased from the healthy portion. In the hands, the palmar surface is all involved, while the folds of skin are exaggerated. The nails, teeth, and hair are unaffected, and there is no ichthyosis. In addition to this hereditary keratodermatitis, there is a common variety, erythematous and irritable in nature, which is developed in later childhood; the disease

comes in a series of attacks, in exacerbations which are more severe in winter, and do not seem to depend upon the use of the hands. The lesion is in the form of patches dotted over the palmar surface of the fingers, just above the lower end of the finger, and anterior to the metacarpal bones, at the apex of the thenar eminence, and on the cubital border of the palmar surface. The epidermis is thickened on the affected spots, but normal elsewhere. If the corneous layer be removed the papillæ will be seen to be hypertrophied, small cone-shaped pieces of epidermis remaining attached to the papillary particles. The nails are often ingrown. Treatment is palliative only, and consists in softening the horny layers by prolonged baths, plasters, applications of soft soap and rubber gloves.

Verruca.

Warts are circumscribed keratoses, with hypertrophy of the papillæ; they are rounded, rough, and cracked. Congenital papillomata, with or without nævi, belong to the class of angiomata, and must not be confounded with warts (verrucose nævi). True warts are acquired, and are especially noticed in later childhood, in school children. There are two varieties: *verruca vulgaris*, projecting, rounded, situated upon the dorsal surface of the hands; *verruca plana*, which extends to the face. All these warts are parasitical and contagious lesions, which have been successfully inoculated. We may daily see cases of its transmission from child to child. The essential lesions of warts are epidermic. Kühnemann found bacteria $1\frac{1}{2}$ μ long, which he cultivated on agar, which were not found in old warts, as the latter become sterile and disappear. Schweninger inoculated rabbits and roosters with cultures of bacilli from warts; two times out of ten he had positive results, *i.e.*, the formation of warty excrescences fifteen days after inoculation. Verruca plana, smaller and flatter than vulgaris, greatly resembles lichen planus; it is situated chiefly upon the face. It is inoculable. In the same subjects, I have several times had occasion to observe the coexistence with these warts of filiform *pendulous* warts either on the hands or the lips. These are filamentous, soft, smooth, and frequently pedunculated appendices, *verruca mollusca*, that Kaposi considers to be allied to fibroma molluscum or molluscum pendulum.

As to *molluscum contagiosum* (acne varioliformis) which is also common in children, it differs from warts by its regular globular umbilicated form; it is very contagious. Caillant[83] on February 22d, 1851, saw in the Hôpital des Enfants malades, Salle Ste. Marthe, a little girl of seven years who was affected with Bateman's molluscum; in the three months following the admission of this little patient, four-

teen out of the thirty other children present were affected with the same disease. Tommasoli[84] found in an asylum in Sienna fifty-six children suffering from molluscum contagiosum, while there was not even one case of it in the other asylums in the city. The disease has been successfully inoculated, and Neisser found in it a parasite of the class of Sporozoa, sub-class Coccidiidea. The treatment of all the varieties of verruca, including the molluscum contagiosum, consists in destroying them by the galvanocautery or the thermocautery. Should there be many of them, on the hand for instance, they should first be scraped, their point of implantation cauterized, and an antiseptic dressing applied. Chemical caustics, such as the nitrate of silver, tincture of iodine, and soft soap are less efficacious. The internal administration of magnesia, 1 gm. (15 gr.) a day, and of the mother tincture of thuya occidentalis have been recommended.

Psoriasis.

Psoriasis is a squamous dermatosis which is as yet not entirely understood. Situated upon the limbs, near the elbows and knees, upon the head, and the scalp, we see rounded patches of dry, white iridescent scales situated upon a red surface which bleeds easily when exposed, as it is covered by a thin and fragile subsquamous cuticle. Sometimes the heredity of the diseases is apparent, and sometimes it is altogether absent. Psoriasis is met with at all ages, even in the first years and months of life. Rille saw a child of thirty-eight days who was affected with the disease. It is, however, more common in later childhood than in infancy. As a rule it is discrete in children, looking like drops of melted wax from a candle scattered here and there on the skin. Relapses are usual. Later, as the child grows older, psoriasis extends and becomes chronic. The hands and the feet are not affected by the disease.

Treatment should be both local and general; the scales must be got rid of by the help of baths, frictions with oil of cade, either pure or with a glycerole of starch, and at the same time the ground (*i.e.*, the constitution) must be modified. The child must not be given any alcoholic drinks or irritating food. If it is arthritic, it should be given the bicarbonate of soda; and if scrofulous, cod-liver oil.

Xeroderma Pigmentosum.

Under this title Kaposi described a diffuse atrophy of the skin, which is observed in young patients from the first year to adolescence (1870). Perrin[85] saw a little girl of six months who was suffering from it; her father and mother were first cousins. It is a family

disease, which may attack several children in the same family, but all of the same sex. In Kaposi's ten cases there were two groups of two and three brothers and sisters; and in forty-three different observations we once had two, four times three, and once seven brothers or sisters affected by the disease. Besnier lays stress upon consanguinity of the parents (cousins german) as a cause (Perrin, Thibièrge). H. J. Barié[b6] has noted a cancerous heredity. The face, ears, neck, shoulders, the chest as far as the third rib, the arms and the back of the hands, sometimes the legs and the dorsum of the feet, are spotted over with brownish-yellow patches, like freckles, with depressions like the cicatrices of smallpox lying between them. In spots the epidermis is thin, smooth, flaky, friable, cracked, and as stiff as parchment. The skin seems to be retracted and thinned in these places, but elsewhere it is normal. The course of the disease is progressive; at first we see small vascular dilatations and little pigmented spots, and then in place of these varicosities we see the atrophic depressions, and a diffuse atrophy of the skin with a wrinkled condition of the epidermis. Next the skin is affected with eczema, fissures, and ulcers; the mouth and nostrils become retracted and ectropion occurs. Five times out of ten Kaposi has seen carcinomatous, sarcomatous, or angiomatous tumors develop in different parts of the face, lips, nose, eyelids, and ears. The patients die young, not living beyond twenty years. Geber classes this bizarre, motley, multicolored disease with pigmented nævi; Taylor calls it a pigmentary and atrophic angioma; Kaposi thinks that it has many points in common with congenital melanosis, nævus, and lentigo; but it differs from nævi by its constant and rapid growth, and by the atrophy of the skin. There is at first a proliferation of the connective tissue of the papillæ and of the vascular endothelium, then retraction and atrophy of these same papillæ, vascular dilatation and neoformation, an abnormal development of pigment, and anomalies in the formation and nutrition of the papillary layer.

According to Besnier, it is a pigmented epithelioma. It must be distinguished from *scleroderma* and *macular leprosy*. The diagnosis will be easy enough to one who has once seen this motley dermatosis with its red spots, lentigo, cicatrices, telangiectasis, tumors, ulcers, ectropion, glandulociliary blepharitis, epiphora, lesions of the lips, etc.

The prognosis is very grave, there being little hope of recovery.

In the way of *treatment* we may try the effect of arsenic in subcutaneous injections, chlorate of potassium as a local application, and electricity.

Cutaneous Tuberculosis.

Tuberculosis of the skin occurs in various forms (lichen scrofulosorum, lupus, gummata). All are of external origin, and are the result of contagion (auto- or heteroinoculation).

Lichen Scrofulosorum.

Hebra and Kaposi have given us the description of lichen of the scrofulous. It is characterized by an eruption of small disseminated papules, about the size of a millet seed or a pinhead. These papules are sometimes grouped in circles, in corymbs, in ovals, and may be accompanied by cervical, submaxillary, or axillary adenopathies, by eczema, or lupus. They are chiefly situated upon the back, the trunk, and the abdomen. They originate in the hair follicles, the sebaceous glands connected with these follicles, and the neighboring papillæ. Each papilla corresponds to a follicular orifice (pilosebaceous follicle, Besnier); it is crowned by scales (squamous dermatosis). The course is very slow. In a case observed by Haushalter,[87] a histological examination showed Koch's bacilli, and the inoculation of guinea pigs gave positive results. Stack also found bacilli and Darier giant cells. This disease, which is very rare in France, is still the subject of much discussion. Occurring in childhood or adolescence, unknown in the adult, it has the appearance of a cutaneous tuberculosis in a papular form. It is very little if at all pruriginous, and is curable.

Kaposi prescribes the internal administration of a teaspoonful, night and morning, of iodized cod-liver oil (1 : 1,000). At the same time inunctions of cod-liver oil should be given and hygienic measures insisted upon.

Lupus.

There are several varieties of lupus. 1. *The cutaneous verrucose tuberculosis* of Rieth and Paltauf, which resembles verruca, or the papillomatous tuberculosis of the anatomists; it is chiefly situated upon the dorsal aspect of the hands and fingers. It is distinguished from warts by the more extensive and less rounded surface, by its covering of crust, its indurated base, and its deep fissures which upon pressure often yield pus. The child may, at one and the same time, have pulmonary tuberculosis, gummata, and scrofula. These cutaneous foci of tuberculosis should be destroyed by means of the curette, the thermo- or the galvanocautery, under cocaine anæsthesia. If the lesion is too hard and too dry, it may be softened by a Vigo plaster.

2. *True lupus.* The erythematous lupus, of somewhat uncertain nature, is exceptional in the child. Lupus tuberculosus vulgaris is common. It occurs in the form of red, indurated, slightly elevated plaques, with intense infiltration of the derma, and yellow tubercles visible on the surface. It is situated on the face, neck, cheeks, and ears, and is often symmetrical in its arrangement; it may be disseminated on the trunk and limbs. But the uncovered portions of the body are the most liable to be affected. Lupus has a long duration and a progressive course; it may be completely cured in one spot, only to extend farther, leaving white, smooth, and depressed cicatrices, and destroying the parts which it invades; it is a mutilating disease. Under the microscope giant cells have been found and a few of Koch's bacilli, and the inoculation of guinea-pigs with lupus has resulted in giving them tuberculosis. Lupus, from its appearance, its deep situation, and its long duration, will easily be distinguished from eczema and impetigo; it might be confounded with certain ulcerogummatous syphilides, were it not that the mercurial and iodine treatment is able to clear the diagnosis.

Treatment should be both general and local. We must give free doses of cod-liver oil, iodine preparations, arsenic, or iodoform; injections of tuberculin have resulted only in failures. Locally, we endeavor to destroy the diseased portions by the curette, by cauterizations and scarifications.

Scrofulotuberculous Gummata.

Gummata of the skin and the subcutaneous tissues are very frequent in young children. The first symptom is a hard lump as big as a pea or a hazelnut, which seems to be incorporated in the unaltered skin. Later the tumor softens, the skin is purplish, fluctuation may be felt, and there is an abscess. This abscess may open spontaneously and give exit to a caseous, non-homogeneous pus, contained in cyst-like pockets infected with tubercles. This has been demonstrated by histological examination and by the inoculation of guinea-pigs. The gummata may be multiple, disseminated, and in various stages of development in the same child; they may coexist with other tuberculous symptoms, as spina ventosa, fungous osteoarthritis, or lupus. From these caseous centres we may have a general invasion of the bacilli, which travel at first through the lymphatic system, stopping at the ganglia, then penetrating into the general circulation, sometimes reaching the meninges, etc. The gummata then must be destroyed. They are to be distinguished from *syphilomata* by the result of specific treatment, from abscesses due to the

streptococcus or the *staphylococcus* by their duration, by a bacteriological examination, and the result of inoculations. Treatment consists in opening the tuberculous masses, extirpating the sac, and sterilizing the wound with a red-hot iron or with iodoform.

Vegetable Parasites.

Certain of the skin diseases common in childhood are caused by vegetable parasites, by mucedineæ which have been the subject of much study and research (pityriasis versicolor, pityriasis rosea of Gibert tinea, alopecia).

Pityriasis Versicolor.

This form of the disease is a superficial, epidermic eruption, consisting of small yellowish-gray, *café-au-lait* spots, irregular as to size, situated on the front of the chest, on the back, between the shoulders, accompanied by a very minute furfuraceous desquamation which is revealed by scratching. By detaching this dust with the nail, we may distinguish pityriasis versicolor from freckles and discolorations of the skin. Pityriasis does not affect the extremities, the hands, feet, or face, and is situated most frequently upon the covered parts of the body. It is seen in later childhood, and gives rise to slight pruritus; it may disappear spontaneously, but is liable to return. The fungus of the disease was discovered by Eichstedt[88] in 1846, and was called by Robin the *microsporon furfur*. It consists of small masses of round spores, ten, twenty, or thirty in number, resembling a bunch of grapes, and of mycelium or filaments which unite the masses and the isolated spores. The filaments or tubes are short, not sinuous, not branched, and are either isolated or placed end to end. Both spores and tubes have a homogeneous investment and slightly granular contents. This vegetable parasite does not penetrate beyond the corneous layers of the epidermis, which it infiltrates. The hairs are unaffected, the skin is white, and not irritated by the parasite; contagion is possible. An eruptive fever, such as scarlatina for instance, may cause the pityriasis to disappear. It must be distinguished from syphilitic roseola, pigmented syphilides, and dyschrœa, which do not desquamate.

The most efficacious *treatment* consists in painting with the tincture of iodine; friction with pumice stone will remove both epidermis and parasite at the same time; we may also use sulphur ointment. To avoid relapses, thorough disinfection of the clothing must be made.

Pityriasis Rosea of Gibert.

Pityriasis rosea of Gibert, the herpes tonsurans maculosus of Hebra and Kaposi, is not rare in childhood. It is an eruption composed of round, rose-colored desquamating spots, which develops after the manner of the eruptive fevers, is not inoculable and not contagious. Its classification is not fully decided. In the beginning we see an erythematous patch, which is slightly elevated but disappears under pressure by the finger; next follows a superficial desquamation distinctive of pityriasis, while at the same time the original red color fades and gives place to a *café-au-lait* color; as a result of the patches not being all of the same age or extent, we have a variety of tints and a polymorphism which are most puzzling. A close examination will reveal the primary lesion, a central areola surrounded by a wrinkled and desquamating ring; the generalization of the eruption is secondary to the initial plaque, which lasts from eight to ten days. The eruption develops from above downwards, from the neck and subclavicular spaces to the upper limbs, and then to the lower, leaving unaffected the face, the hands, and the feet. There are no prodromes, the general condition is but little affected; itching is scarcely noticeable. A succession of attacks has been noticed in some cases, which may prolong the disease to several weeks (two weeks to two months). There must certainly be a parasite, but it is not that of trichophytosis.

The diagnosis is difficult; true eczema and psoriasis are easily distinguished, but we may perhaps suspect seborrheal eczema, ringworm, or syphilitic roseola.

The disease is not a serious one, and is cured without treatment. We may prescribe a few simple emollients, or alkaline baths (1 oz. of the borate of sodiun to 25 gallons), and a few inunctions may be made with oxide of zinc ointment (1 : 10).

Trichophytosis.

This is a disease of the skin produced by a fungus or by several varieties of fungus, which have been well studied by Sabouraud. We distinguish between trichophytosis of the hairy and that of the smooth parts (herpes circinatus).

1. *Ringworm of the scalp* with small spores. This is the most serious and the most tenacious of the diseases of the scalp; it is propagated by contagion and is seen especially in poor children and in school children. It is transmitted by direct or indirect contact, by the agency of toilet articles, scissors, shears, pillows, furniture and carriage coverings, etc. Domestic animals, cats, dogs, horses, have been said to transmit it. Gruby's tinea tonsurans with small

spores is due to the *microsporon Audouini* (Sabouraud); it is the most frequent, the most contagious, and the most obstinate form of the disease. We see short gray hairs, lying in the same direction upon an epidermis covered with gray scales. Around an old plaque we find here and there points of recent inoculation, characterized by broken, scaly, and gray hairs. The hairs affected are fragile, cannot be pulled out, but are easily broken. Through the magnifying glass we can see that the hair, for a distance of about 3 mm. ($\frac{3}{25}$ in.) from its root, is covered with a whitish and regular sheath, from which the point of the hair seems to emerge; this telescope-like appearance is very characteristic. The patches grow from the periphery, and the germs detached from the diseased hairs lodge elsewhere and cause new foci of disease. It is very rare to find only one patch; there are usually ten, fifteen, or twenty, and sometimes the whole scalp is affected. All the lesions are round. After fourteen years of age there is no risk of contagion from this disease. It occurs between infancy and puberty. It may last five or six years, and is cured spontaneously, without leaving either alopecia or cicatrices. During the process of recovery the diseased hairs are thrown off one by one. The diagnosis is easy; no other trichomycosis has fine, brittle hairs upon a round patch covered with gray scales. We must distinguish it from the seborrheal eczemas, from psoriasis and trichophytosis circinata, which has neither scales nor sheaths of the hair. Under the microscope the diseased hair seems to be covered and filled with sporules in juxtaposition, which go beyond the boundaries of the hair, forming a sheath. These spores form an irregular mass around the hair without penetrating it; the hair is covered with a furry coat of brilliant, polyhedral, very small and irregular spores, which are agglomerated together without showing any regular filaments; such is the *microsporon Audouini.*

2. *Tinea Trichophytina.*—Trichophytosis may attack the smooth parts as well as the hairy; it may even attack the nails. We therefore have to study: (*a*) Herpes circinatus; (*b*) tinea tonsurans; (*c*) onychomycosis trichophytina.

(*a*) *Tinea Circinata, Herpes Circinatus.*—The eruption is situated upon the neck, face, trunk, or limbs, forming either one circle or a series of circles which extend excentrically. Beginning as an eczematous spot, the herpes circinatus develops into a circle of increasing size by removal of the epidermis at the periphery, the central portion meanwhile returning to a normal condition. If we scrape off a few scales from the peripheric zone, and treat them with a forty-per-cent. solution of caustic potash, then placing them under the microscope, we shall see rectilinear filaments, from 3 to 6 μ in diameter, within

rectangular cells which here and there are bifurcated, forming an irregular plexus; thus we have rectilinear filaments, formed of quadrilateral spores, dividing dichotomously. The disease is very benignant, and is cured by painting the spot for a few days with the tincture of iodine; sometimes a cure is spontaneous.

(*b*) *Tinea Tonsurans.*—This begins by a circle similar to that of herpes circinatus, and then the parasite descends into the hair follicles and invades the hair; the epidermic circle disappears, and the hair lesion remains. Between the healthy hairs we may then see more or less numerous patches of hairs broken short at the opening of the follicle; these patches may be very small. A number of healthy hairs persist upon the diseased spot, completely hiding it when they are long enough; the diseased hairs do not project above the surface. If the head is shaved, we see in addition to the primary lesion numerous minute secondary points of disease, the entire head being dotted over with little patches 3 to 4 mm. in size ($\frac{4}{25}$ in.), which look like grains of powder or comedones. The surfaces are not round but irregular; the broken hairs do not emerge—they are included and bent within the skin, and cannot emerge because of their softness. Herpes circinatus often coexists with this disease. The multiplicity of the lesions increases the duration of the disease, which may persist beyond puberty to seventeen, eighteen, twenty-two, or twenty-three years (Sabouraud). The average duration is twelve to fifteen months. This difference between tricophytosis of the hairy parts and that of the smooth parts is due to the fact that the hair is lodged in a sort of pit into which the parasite accompanies it, and where it cannot be reached by antiseptics. If we take a diseased hair and treat it with a warmed solution of caustic potash, we shall see that it is filled with contiguous quadrilateral or ovoid spores, of 5 to 7 μ, crowded into rectilinear lines, following the axis of the hair. The parasite is entirely formed of spores, all alike and situated in the interior of the hair which they entirely fill.

In order to cure the disease, we must first circumscribe the invaded regions and protect the healthy parts; having cut the hair, we draw a brush dipped in a carbolized solution of fuchsin around the patches of disease, and touch any isolated points. Then around each patch thus marked we depilate a border about 1 cm. wide ($\frac{2}{5}$ in.). We next paint the entire scalp with the tincture of iodine, which shows darker on the affected portions. The cutting of the hair should be repeated every week, and the depilation every month. This treatment is applicable to every form of tinea.

(*c*) *Onychomycosis Trichophytina.*—In this extremely rare lesion, the nail is increased in thickness, its substance being porous, gray,

and opalescent, similar to pith. A microscopic examination will show the same parasite as in the hair. The duration is very long. The parasite must be destroyed, either after having removed the nail, or by filing and so gradually reducing it, and applying caustics and antiseptics.

Treatment of Ringworm with Small Spores.—Three times a week the affected parts are to be shaved, and the tincture of iodine is to be applied. If the diseased patches are more extensive than the healthy portions, a moist dressing should be made by means of absorbent cotton saturated with a solution of iodine (1 part) in a saturated solution of iodide of potassium (50 parts). This is to be covered over with a rubber bandage, and removed every morning. The skull cap should be washed with tepid and then with cold water, the scalp with soapy water, and then rubbed with alcohol.

Treatment of Tinea Tonsurans.—Pericapillary inflammation is an enemy to tricophytosis; we should therefore excite an inflammation of the follicle, which will result in expulsion of the diseased hair without the formation of a cicatrix. This may be brought about artificially by means of croton oil, which will cause a profound dermatitis without going on to suppuration. We at first proceed as in the case of tinea with small spores (epilation, painting with the tincture of iodine). Then we make use of a crayon of cacao butter, wax, and croton oil, by applying it all over the patch, which we then wipe with a dry cloth. If this causes blistering we should apply a starch poultice sprinkled with camphorated alcohol; at the end of five days, epilation and the tincture of iodine; at the end of ten days, a new application of the crayon, and so on. The skin, thus irritated, will resemble an orange peel. If small foci of disease persist, they may be destroyed by electrolysis, the galvanocautery, or croton oil.

Prophylaxis of Tinea Tonsurans.—For the prevention of this affection, it would be a very good thing were it made obligatory to report the disease, and if schools were regularly inspected by competent physicians. The disinfection of houses is superfluous. The patients must be isolated. In schools, it should be forbidden to exchange hats or to play with them. The hair must always be shaved. In families, each person should use separate toilet articles in order to protect the brothers and sisters of the little patients. The clothing, especially the head coverings, must be disinfected; washing them in lye will be sufficient. The parasites die at 80° (176° F.). The underclothes should be boiled; caps and woolens should be immersed in a cold solution of bichloride 1 : 1,000.

Favus.

Favus, or tinea favosa, is a mycosis common to man and to some animals. More rare in Paris than tinea tonsurans, favus is a rural disease, without tendency to a spontaneous cure, and contagious both directly and indirectly. It is a disease of poverty alone. The lesion of favus is peripapillary, and always contains a downy or adult hair at its centre. It begins with a white, pinhead point, which if pierced empties itself like an abscess; if left alone it increases in size and becomes yellow. At the end of a few weeks the little abscess is about 3 mm. ($\frac{3}{25}$ in.) in diameter, and forms a ring which is hollow in the middle, around a hair (favus-cup); the investing epidermal layer has disappeared. The hair for about 1 cm. ($\frac{2}{5}$ in.) in length is tow-colored and lustreless, without being brittle. The scutulum increases in size, and may become as large as a half-franc piece (silver dime) or even larger. Several cups may unite to form a rocky, projecting, and irregular mass. There is a mouse-like odor. The course is slow. The hairs fall and are replaced by a smooth cicatrix with irregular outlines. After a few years the whole head may be invaded, but a strip of healthy hair persists around the edge of the scalp. The duration of the disease is long and indefinite. Upon the skin of the body the development of favus is the same, except that it does not go on to the formation of cicatrices. Favus of the nails does not form cups, and resembles onychomycosis tricophytina. W. Dubreuilh has described atypical forms of favus, resembling impetigo, pityriasis, and alopecia.

Under the microscope the hairs, which are long and not brittle, are seen to be filled more or less completely by mycelium filaments, the *achorion Schönleinii.*

Treatment.—Favus is never cured spontaneously; it must be treated by epilation, which acts mechanically by dragging out the greater part of the parasite. Two or three epilations of the same hair will finally remove the last fragment of mycelium from within the follicle. The crusts are to be removed by a starch poultice, scraping with a blunt curette, and the application of tincture of iodine. Two days later all the hair of the affected region is to be depilated, and a border about 2 cm. ($\frac{4}{5}$ in.) wide besides. Treatment should be suspended for a month, and washings of camphorated alcohol or salol alcohol (15 gm. [4 dr.] per 1,000), alternating with iodized vaseline (one-thirtieth or one-fortieth). Another depilation at the end of a month. In this manner we may cure a favus of average severity in six months. As to favus of the skin, it should be

scraped, cleansed, and treated with the tincture of iodine. The prophylaxis is the same as for the other forms of tinea. Children suffering from favus must not be allowed to consort with those affected with tricophytiasis.

Alopecia Areata.

Alopecia areata (Sauvages), area Celsi, porrigo decalvans (Bateman), is found in adults as well as in children. It is characterized by white, ivory-like, circular bald spots in the midst of healthy hair. It is common in cities, rare in the country, and is contagious. The first symptom is the falling of the hair in a circumscribed area; there are one or several patches, and the whole head even may be bald. Around the patches the hairs are so loose that they fall upon the slightest traction. The disease begins upon the crown or the back of the head, infection being carried by the backs of chairs, cushions, etc. The skin is slightly depressed around the colorless patch. At its circumference there is a zone of scanty diseased hairs, whose radicular extremity is thinned, whose medulla has disappeared, to be replaced by air bubbles (atrophy of the hair). The patch grows excentrically. At the end of from five to six weeks we perceive some downy hairs, and little by little the malady is cured, but there may be a relapse. There are some forms of alopecia with *fragile hairs*, which when pulled upon break instead of falling in their entirety, and this may lead us to suspect tinea. The disease, as a rule, is benign in children, for at that period of life the grave forms with multiple patches, the generalized alopecias, are exceptional. Recovery occurs in from two to three months.

We must distinguish from true alopecia areata the temporary alopecias from acute diseases, which are diffuse and not circular; the alopecia of the newly born, which is situated upon the occiput and is due to the pressure of the pillows; the cicatricial alopecias, which are permanent and irregular; and congenital alopecia from lack of development of the hair follicles, from retarded development, or from some intrauterine disease.

The disease is certainly contagious, and the parasitic agent has been sought for in connection with this contagiousness. Gruby described the microsporon Audouini as the fungus of alopecia, but it is that of tinea tonsurans with small spores. In 1874 Melassez described a parasite which more recent researches have proved to be of no pathogenic importance. Thin (1881) and von Schleu (1885) have found bacteria; Vaillard and Vincent (1890) have described a micrococcus which they consider as the agent of alopecia or a pseudoalopecia; Sabouraud [89] described a pathogenic agent which was also found in seborrhœa oleosa.

Treatment.—The general condition not being involved, we are obliged to limit ourselves to a local treatment, which may be summed up in the words, antisepsis and stimulation of the scalp. We first get a definite outline of the area to be treated by shaving the hair; epilation is not indispensable in the ordinary forms. Every night we must rub in a sulphur ointment, 1 : 10. In the morning this is washed off with soap, and with a soft brush we apply this lotion:

℞ Alcohol (90°), ...	100 gm.	℥ iij.
Tincture of rosemary, ...	50 "	℥ iss.
Bichloride of mercury, ...	15–30 cgm.	gr. iiss.–v.

The alternating use of sulphur and bichloride favors the ingrowing of the hair. The patch itself may be painted with a solution of bichloride, 1 : 100, to which one-tenth or one-fifteenth of acetic acid has been added. I have obtained good success by painting with the tincture of iodine.

The prophylaxis consists in forbidding a community of goods as regards toilet articles, in keeping the heads of the patients covered, and in keeping them out of small schools. In the large schools the patients may be secluded and their heads wrapped, without necessarily interfering with their studies.

Animal Parasites.

Scabies.

Scabies is caused by an insect called the *acarus* or *sarcoptes scabiei.* The disease is one which may occur at any age, is due to contagion only, and may affect even new-born infants. The parasite, being nocturnal, is transmitted best in bed. It is a small insect, from $\frac{1}{3}$ to $\frac{1}{5}$ of a mm. ($\frac{1}{75}$ to $\frac{1}{125}$ in.), striated and covered with hairs, and shaped like a tortoise. It has a rounded or beaked head, and four pairs of paws, each of which ends in a sucker. In the males, which are rarer and smaller than the females, the third pair has no suckers; in the females the two posterior pairs end in hairs. The egg, which may be seen by transmitted light in the body of the female, is $\frac{1}{7}$ mm. ($\frac{1}{173}$ in.) in length, and yields a larva with three pairs of paws. At the proper time for laying her eggs, the female cuts a burrow, a little underground passage in the epidermis, in which she deposits her eggs and in which she dies. Each burrow, whether rectilinear or sinuous, is from several millimetres to 2 cm. ($\frac{1}{5}$ in.) long. The under part of the burrow is indented by the presence of the parasite, which we may find by inserting the point of a pin. By the side of the burrow (and this is characteristic of scabies) we may find secondary, polymorphous lesions, papules of pruri-

go, eczema, impetigo, ecthyma, lymphangitis, and small abscesses. The principal symptoms are itching, which is worse at night than in the daytime; lesions of scratching on the wrists, fingers, interdigital spaces, feet, genital organs, breasts, and axillæ. The face is not affected. In children the secondary lesions, pyodermias (ecthyma, abscess) are more frequent than in the adult; the scabies is more apt to be pustular. The polymorphism of the lesions, their situation upon the parts indicated above, and the presence of burrows, will enable us to recognize scabies; at the same time we shall probably learn that other members of the same family are also affected. We shall have to make the diagnosis between scabies, lice, and Hebra's prurigo. The prognosis is not grave, but the duration may be long if the diagnosis is not made.

Treatment consists in the use of topical parasiticides which will sterilize the body of the child, and in the disinfection of its clothing and bedding in a hot oven or by means of sulphur. In larger children rubbing with sulphur ointment is very efficacious. In infants styrax ointment, pure or mixed with olive oil or sweet almond oil, will answer the purpose. The balsam of Peru, applied as an ointment or with a brush upon the affected parts, has done me good service. We may also have recourse to petroleum soap, to naphtholized ointments, etc.

Pediculosis.

There are three kinds of pediculi: 1. The *pediculus pubis*, which is found upon the hairy regions of the genital organs, and which produces blue spots. This is very rare in childhood, but has been found in nursing infants on the eyelashes, having caused blepharitis. The blepharitis may be cured by an ointment of the yellow oxide of mercury. 2. The *pediculus vestimentorum*, much larger than the head louse. 3. *Pediculus capitis*, the parasite of children. It is a wingless insect, from 1 to 2 mm. long ($\frac{1}{25}$ to $\frac{2}{25}$ in.), armed with a beak and mandibles, depositing its eggs or nits upon the hair to which it clings. These lice are found on poor, ill-kept, unkempt children, who communicate them to each other at school and in their games. The secondary effects vary according to the cleanliness of the children and their idiosyncrasies. Many have merely an itching with a few insignificant cervical adenopathies. Others have lesions of scratching, impetiginous crusts, eczema of the head (impetigo granulata), papules of prurigo on the neck and back, more or less extensive lymphangitis, subcutaneous abscesses, furuncles, anthrax, and pustules of ecthyma. Many have a persistent pigmentation of the skin. The secondary lesions are therefore sometimes of great gravity. Treatment consists

in shaving the hair, in washing the scalp with tepid water, and in removing the crusts by means of poultices or ointments. In the case of a young girl the hair need not be cut, but the lice may be killed with mercurial ointment, with a bichloride solution (1 : 500), with camphorated alcohol, powdered pyrethrum, or staphisagria. To detach and kill the nits, we may comb the hair with a fine comb dipped into hot vinegar containing 1 : 300 of corrosive sublimate.

Fleas, Bedbugs, Mosquitoes, Bees, Etc.

The common flea, *pulex irritans*, causes a lively sensation of pricking, immediately after which we find a red circle and an urticarial swelling which lasts from a half-hour to an hour, and which is followed by a purpuric spot. In some children the body is dotted with these little spots, which remind one of nævi or purpura.

The bedbug, *cimex lectularius*, or acanthia lectularia, causes an intense pruritus with urticaria, and lesions of scratching. The itching, which is very severe at night, disappears in the daytime with the retreat of the parasites.

The mosquito (*culex pipiens*) causes a painful pricking, with a swelling of the skin which differs from urticaria by its longer duration; the child is disfigured by the lesions of scratching and the swelling caused by each bite.

Bees, wasps, and other insects of the same order produce an even more marked reaction, which is sometimes dangerous if the sting is upon the mucous membranes.

These bites and the resulting reactions are to be treated by ammoniacal lotions, or by a 5 : 100 solution of the chlorhydrate of ammonia. As a preventive to keep the insects away, we may anoint the skin with vaseline or oil containing 1 : 100 of carbolic acid, menthol, or camphor. Lotions containing vinegar or salicylic acid are also useful.

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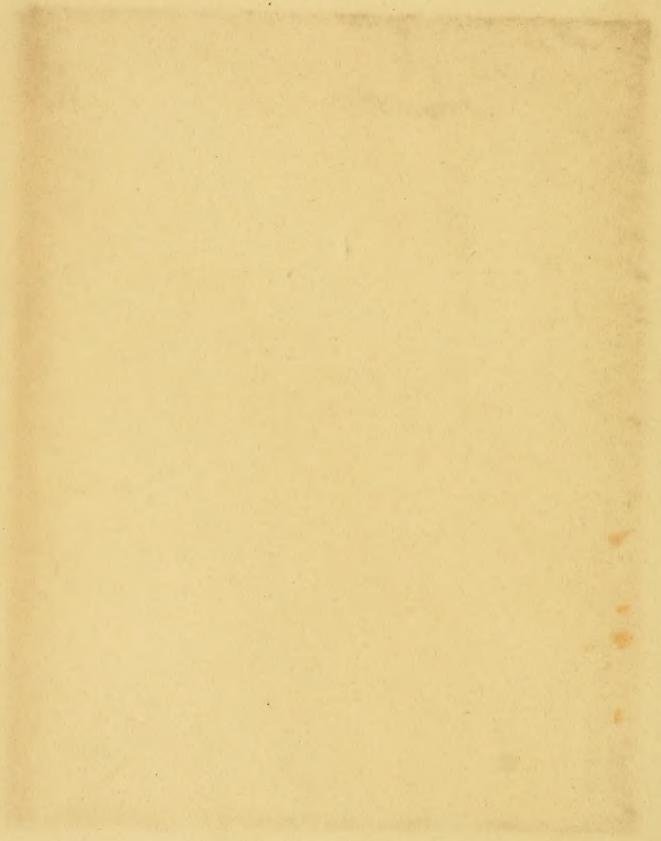

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